

CHAPTER 3

AFFECTED ENVIRONMENT

INTRODUCTION

The information in this chapter is a summary of the information provided in the Analysis of the Management Situation (AMS), which was distributed for public review. The AMS contains information on the current management policies and regulations, more detail on the existing condition of some resources, habitat requirements for fish and wildlife species, information on current trends, and the resource specialists' determination of where change is needed in the current management direction. Maps from the AMS are referenced in this chapter as **AMS Figures** and are included electronically in PDF format on a compact disc with this document.

Throughout this document, the term "Planning Area" (PA) refers to the eight-county area with land administered by the BLM's Butte Field Office. The term "Decision Area" (DA) refers to all surface and subsurface (mineral estate) BLM-managed public lands in the PA.

HOW TO READ THIS CHAPTER

Chapter 3 provides information on the current condition of resources, resource uses, and programs that could be affected by the revised RMP alternatives described in Chapter 2. This chapter is organized into Resources, Resource Uses, Special Area Designations, and Social and Economic. Each of these sections is further divided into resources or program areas. This is the organization prescribed in the BLM guidance (USDI-BLM 2005a).

RESOURCES

AIR QUALITY

Several sensitive ecological areas designated by the Prevention of Significant Deterioration regulations as Mandatory Class I Areas are located within and near the PA airshed. These Class I areas include:

- Anaconda-Pintler Wilderness in western Deer Lodge County.
- Gates of the Mountains Wilderness in Lewis and Clark County.
- Scapegoat Wilderness in Lewis and Clark County.
- Yellowstone National Park (northern and northwestern portions) in Gallatin County.

Potentially affected Class I areas near the PA include the Bob Marshall Wilderness, which abuts Lewis and Clark County's western border, Glacier National Park, about 25 miles north of Lewis and Clark County, and the Red Rock Lakes Wilderness, located approximately 15 miles west of the southern part of Gallatin County.

Although air quality in most of the PA airshed is considered excellent, localized issues in some urbanized centers do not comply with the applicable EPA National Ambient Air Quality Standards (NAAQS) and the Montana Ambient Air Quality Standards (MAAQS) for certain pollutants designated as criteria pollutants by the Clean Air Act. Consequently, the EPA has designated two areas as "non-attainment areas":

- City of Butte, which is rated as not attaining standard conditions (non-attainment category) for coarse, inhalable particulate matter having an aerodynamic diameter of 10 microns or less (this category of particulate matter pollutants is referred to as PM₁₀),
- City of East Helena, which is in the non-attainment category for lead.

Currently, there are no non-attainment designations for fine particulate matter (PM_{2.5}) within the Planning Area. The closest non-attainment designation is Lincoln County in the far northwest portion of the state of Montana.

Air Quality Monitoring and Standards

The state of Montana maintains a network of ambient air quality monitoring stations. Pollutant monitoring is performed in Belgrade, Bozeman, Butte (two stations), Helena (two stations), Lincoln, and West Yellowstone (two stations). Seven of these nine stations monitor PM₁₀ on a daily (24-hour) basis. Two of these stations also monitor PM₁₀ continuously, while three monitor daily PM_{2.5} as well. Two different stations are equipped to continuously monitor ambient air concentrations of carbon monoxide.

Maximum measured ambient air concentrations for the criteria pollutants in Gallatin, Silver Bow, and Lewis and Clark Counties for 2003, from EPA's AirData database system (USEPA 2004), are presented in **Table 3-1**. This is the most complete recent data set available through the EPA. Data from these monitoring stations indicate that there were no exceedences of national or Montana ambient air quality standards in 2003. No monitoring station in the East Helena non-attainment area is currently reporting data on lead emissions. The most recent data available for lead in EPA's ambient air database is for the year 2001, and shows compliance with national standards for lead emissions.

Air quality issues center mainly on sources of particulate emissions. PM₁₀ are emitted by industrial plants such as mines, quarries, and sawmills that produce dust from mechanical operations. Other common sources of PM₁₀ are vehicle traffic on paved and unpaved roads and smoke and dust and exhaust from construction or development activities. Most PM_{2.5} in ambient air is believed

Table 3-1
Background Criteria Air Pollution Data

Pollutant	Averaging Time	Federal (NAAQS)	Montana (MAAQS)	Maximum Monitored Value (2003) ^{a,b}		
				Gallatin	Silver Bow	Lewis and Clark
Carbon Monoxide	Hourly	35 ppm	23 ppm	8.6 ppm	5.5 ppm	NDA
	8-Hour	9 ppm	9 ppm	2.1 ppm	4.0 ppm	NDA
Ozone	1-hour	0.12 ppm	0.10 ppm	NDA	NDA	0.079 ppm ^{3c}
	8-hour	0.08 ppm	--	NDA	NDA	0.065 ppm ^{3c}
Lead	90-Day	--	1.5 µg/m ³	NDA	NDA	NDA
	Quarterly	1.5 µg/m ³	--	NDA	1.02 µg/m ^{3,d}	NDA
Sulfur Dioxide	Hourly	--	0.50 ppm	NDA	NDA	NDA
	3-Hour	0.50 ppm	--	NDA	NDA	0.10 ppm ^d
	24-Hour	0.14 ppm	0.10 ppm	NDA	NDA	0.03 ppm ^d
	Annual	0.03 ppm	0.02 ppm	NDA	NDA	NDA
Coarse Particulate Matter (PM ₁₀)	24-Hour	150 µg/m ³	150 µg/m ³	68 µg/m ³	49 µg/m ³	83 µg/m ³
	Annual	--	50 µg/m ³	26 µg/m ³	16 µg/m ³	23 µg/m ³
Fine Particulate Matter (PM _{2.5})	24-Hour	35 µg/m ³	--	23 µg/m ³	39 µg/m ³	29 µg/m ³
	Annual	15 µg/m ³	--	8.1 µg/m ³	8.3 µg/m ³	6.8 µg/m ³

NDA = No Data Available; ppm = parts per million; µg/m³ = micrograms per cubic meter

^aData in table is for maximum values reported in the year 2003 with the exception of annual particulate matter results, which are presented as the annual geometric mean.

^bMonitoring data are not available through the EPA AirData Database for Nitrogen Dioxide (NO₂) and Ozone (O₃) since no counties within the PA have monitoring stations for these pollutants.

^cThe Ozone result presented for Lewis and Clark County was measured at the Glacier National Park monitoring station in Flathead County. This station is in the impact zone for Ozone precursors emitted in parts of the PA.

^dThe latest available data for lead and sulfur dioxide are those from calendar year 2001.

to arise from combustion processes or atmospheric reactions among naturally occurring or industrial pollutants. Both forms of particulate matter are inhalable and penetrate the lungs, where they may be deposited. This is the primary reason for EPA's regulation of these particles at different levels.

Particulate emissions of both types within the PA are produced during prescribed burns of timber and underbrush by forest management, as well as wildland fire, private debris burning, agricultural burning, slash burning, and wood burning stoves and fireplaces. These emission situations are generally transitory and do not pose significant risks to human health because exposures can often be minimized or avoided. However, smoke from large fires, particularly PM_{2.5}, can traverse great distances, sometimes thousands of miles, and can impact visibility in nearby and even distant Class I areas. Air quality and visibility can also deteriorate locally due to temporary air stagnation events.

The Montana/Idaho Airshed Group has developed a Smoke Management Program to address smoke production from wildland and prescribed fires. Accumulation

of smoke from controlled burning is limited through monitoring of weather conditions and formal coordination of activities through the Monitoring Unit in Missoula, Montana. The Monitoring Unit decides daily on burning within a particular airshed depending on adequate smoke dispersion. Airsheds in the PA are Airsheds 5, 6, 7, 8A and 8B.

Climate

The climate of the region is modified northern Pacific Coast type with continental components. **Table 3-2** provides a sampling of data recorded within the PA. The Rocky Mountains exert the main influence on climate. Winter days are marked by cold temperatures and cloudy days. Winter Chinook winds blow frequently from 25 to 50 miles per hour and can create warm, windy days east of the Continental Divide, while temperatures remain steadier in the mountain valleys. In the summer, the heat and dry conditions are somewhat modified by mountainous terrain west of the PA.

Table 3-2
Sampling of Climate Data in Planning Area

Parameter	Bozeman: Montana State Univ.	Butte: FAA Airport	Gardiner	Helena: Weather Service Office
Period of Record	1892–2003	1894–2003	1956–2003	1893–2003
Average Maximum Temperature	81.0°F	79.7°F	85.9°F	82.7°F
Month of Average Maximum Temperature	July	July	July	July
Average Minimum Temperature	11.8°F	7.3°F	13.7°F	11.2°F
Month of Average Minimum Temperature	January	January	January	January
Average Annual Precipitation	18.26 in.	12.77 in.	9.89 in.	11.94 in.
Average Annual Snowfall	85.1 in.	56.8 in.	25.2 in.	51.3 in.
Annual Mean Wind Speed	NDA	NDA	NDA	7.7 mph
Annual Prevailing Wind Direction	NDA	NDA	NDA	West

in. = inches; °F = degrees Fahrenheit; FAA = Federal Aviation Administration; mph = miles per hour; NDA = No Data Available

Global Climate Change

On-going scientific research has identified the potential impacts of anthropogenic “greenhouse gas” (GHG) emissions (including carbon dioxide, CO₂; methane; nitrous oxide; water vapor; and several trace gases) on global climate. Through complex interactions on a regional and global scale, these GHG emissions cause a net warming effect of the atmosphere (making surface temperatures suitable for life on earth), primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO₂ concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change (IPCC 2007a) recently concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.”

Global mean surface temperatures have increased nearly 1.8°F (1.0°C) from 1890 to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° N) have exhibited temperature increases of nearly 2.1°F (1.2°C) since 1900, with nearly a 1.8°F (1.0°C) increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5 to

10.4°F (1.4 to 5.8°C) above 1990 levels. The National Academy of Sciences (2006) has confirmed these findings, but also indicated that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures.

Over the last century, the average temperature in Helena, Montana, has increased 1.3°F, and precipitation has decreased by up to 20 percent in many parts of the state (USEPA 1997, Hansen et al. 2001). Over the next century, climate in Montana may change even more. Similar temperature changes have occurred in the past, but the previous changes took place over centuries or millennia instead of decades. One confounding issue in determining whether GCC is actively affecting conditions in the Planning Area is what is apparent from long-term climate data.

In many cases it is inherently difficult to discern whether global climate change in and of itself is already affecting resources in Montana, let alone the Planning or Decision Areas for the Butte RMP. This is particularly difficult in the context of multiple mechanisms or causes contributing to the resource conditions that currently exist. In most cases there is more information about potential or *projected* effects of GCC on resources. It is important to note that projected changes are likely to occur over several decades to a century.

While it is difficult to specifically determine current effects of global climate change on resources in the Butte RMP Planning Area, a number of projected effects are forecasted to occur over the coming decades. The Environmental Protection Agency (Region 8) predicts

that for the region of the United States that includes Montana, a number of predicted effects of climate change will occur. These predicted changes include (USEPA 2008):

- The region will experience warmer temperatures overall, with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations, leading to less snow.
- Earlier snowmelt means peak streamflows will be earlier, weeks before the peak needs of farmers, ranchers, rafters, and others. In late summer, rivers, lakes and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts will occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier summer conditions will reduce the range and health of ponderosa and lodgepole pine forests, and increase susceptibility to fire. Grasslands and rangeland could expand into previously forested areas.
- Ecosystems will be stressed and a number of wild-life species such as the mountain lion, black bear, pine marten, and bald eagle could be further stressed.

GEOLOGIC RESOURCES

Seismic activity (earthquakes), landslides, rock falls, earth flows, slumps, debris flow, and avalanches are all examples of geologic hazards that can occur within the PA. A belt of seismic activity, known as the Intermountain Seismic Belt, is about 100 miles wide and extends through western Montana from near Kalispell in the northwest corner of the state to Yellowstone National Park in the southwest. Within the Intermountain Seismic Belt, approximately 70 mostly high-angle, steep-range bounding faults are known to have been active in the last 1.6 million years, and more than 5,000 earthquakes have been recorded since 1982, according to the Montana Bureau of Mines and Geology (MBMG 2005).

Almost the entire PA is included in the Intermountain Seismic Belt. A branch of the Intermountain Seismic Belt, called the Centennial Tectonic Belt, extends west from the northwest corner of Yellowstone Park, through southwestern Montana, and into central Idaho. The Centennial Tectonic Belt includes at least eight major active faults. The site of the largest historic earthquake in the northern Rocky Mountains, the August 18, 1959 Hebgen Lake, Montana earthquake (magnitude 7.5), is located in the southwestern-most portion of the PA. Although it has been over four decades since the last destructive earthquake in Montana, small earthquakes are very

common in the region, averaging 7 to 10 per day (<http://mbmgquake.mtech.edu>).

Landslides, earth flows, and slumps are common where 1) slopes are steep, and 2) impermeable ground conditions occur, seasonally or otherwise, that result in saturated soils or areas of high moisture content. In addition to natural processes such as earthquakes, road building and vegetation removal in areas of steep terrain can also trigger landslides.

Debris flows are comprised of fluidized sediments that rapidly move downslope, forming channels of saturated, viscous, slurry-like material. They usually occur in association with very high rainfall or rapid snowmelt events. They typically affect only small areas, with the greatest erosion occurring in the flow channels. Debris flows can destroy roads and bridges in their paths, and can cause physical injury or property damage.

Rock falls are common in many areas and are associated with locally steep terrain, road cuts, stream valleys, cliffs, peaks, and ridges. Rock falls can be triggered by temperature fluctuations, precipitation events, or seismic activities.

Snow avalanches are large masses of snow or ice in swift motion down a mountainside or over a precipice. Snow slides commonly occur in chutes near mountain peaks and along ridges. Both human activity and natural processes can trigger an avalanche.

SOIL RESOURCES

Soils were surveyed and are available for the PA including Broadwater, Deer Lodge, Gallatin, Jefferson, and Lewis and Clark counties. Soils were surveyed in Beaverhead, Park and Silver Bow counties. The data is not yet completed and published although some is available through the NCSS Web Soil Survey (NRCS 2004a). Three major geologic units found include the older Precambrian Belt Series sedimentary rocks, Boulder batholith granite and related rocks, and younger Tertiary volcanic and sedimentary deposits. In addition, mountain glaciations during the more recent Quaternary period helped shape and carve the mountain topography. Eroded bedrock from the mountains was deposited in the adjacent valleys.

The granitic Boulder batholith commonly weathers to weakly-developed sandy texture soil horizons over coarse sand to slightly decomposed granite subsurface layers.

Soils that have developed from Belt Series bedrock typically are fine sandy or loamy soils with high percentages of coarse fragments (Veseth and Montagne 1980). The soils are non-calcareous except for specific areas where calcareous strata (impure limestone) is exposed at or near the surface.

Soils in the Tertiary valley-fill can be highly variable in physical and chemical properties due to the inherent

variability of the source rock. The soils in this landscape setting may also have formed from more recent Quaternary sediments or other bedrock deposits.

The basic soil mapping units of the Soil Survey Geographic Database and National Soil Information System can be correlated with the underlying igneous rocks, limestone, or argillite, or mixed colluvial and alluvial deposits. Of the five basic soils forming factors (climate, organisms, parent material, topography, and time), parent material, and topography primarily influence the development of soils in the PA.

WATER RESOURCES

The PA generally consists of headwaters of the Missouri River (Big Hole River, Jefferson River, Madison River, and Gallatin River) and to a lesser extent, the Yellowstone River and Clark Fork River.

Topography varies from steep rugged mountains of the Madison, Gallatin, Bridger, Crazy, and Absaroka ranges to broad grassy valleys around the towns of Bozeman, Butte, and Helena. Elevations range from 11,200 feet in the Absaroka Range to 3,400 feet along the Missouri River below Holter Lake.

Precipitation patterns are affected primarily by local terrain. Mountain ranges cause rain shadow and other orographic effects, resulting in variations in annual precipitation from 10 to 15 inches in the valleys to 30 to 60 inches in the mountains (Western Regional Climate Center 2004). May and June are the wettest months; however, moisture from mountain snowpack typically sustains the major streams and rivers all year.

The EPA has determined that streams and rivers, or segments fail in achieving beneficial use(s) as designated by the MDEQ and are therefore considered impaired. Impairment status is based on numeric and narrative criteria for chemical, physical, and biological conditions of each water body. Each of the impaired water bodies is evaluated by the state to determine how to attain their beneficial uses by meeting TMDL limitations. As such, any water body in the Decision Area, and possibly portions of the PA, that is on the Section 303(d) List is considered adversely impacted until removed from the List. Impaired water bodies in the DA based on the Section 303(d) List for Montana (MDEQ, 2006) are listed in **Table 3-3**.

4th Hydrologic Unit Code	Stream Segment Within BLM Land	Miles Within BLM Land	Probable Impairment Type(s)^A	Probable Impairment Source(s)^B
Big Hole River (10020004)	Big Hole River	8.83	1, 2, 4, 8, 10	1, 4, 6, 8, 10, 17, 18
	Camp Creek	1.51	1, 2, 5, 8, 10	9, 10, 12, 18
	Charcoal Creek	1.34	5, 6, 8	10, 12
	Deep Creek	0.87	1, 2, 8	9, 10, 13
	French Creek	0.06	10	18, 20
	Jerry Creek	0.40	1, 2, 7, 8, 10	1, 2, 6, 8, 9, 10, 14, 18
	Moose Creek	5.90	1	9
	Sawlog Creek	0.80	2, 5, 8, 10	10, 12
	Soap Creek	5.00	2, 5, 8	9, 10, 12
	Sevenmile Creek	0.27	2, 8	6, 13
	Wickiup Creek	0.07	2, 5, 8, 9, 10, 11	10, 12, 19
	Jefferson River	0.56	1, 2, 4, 8, 10, 11	5, 9, 13, 17, 18
	Big Pipestone Creek	3.26	1, 2, 4, 5, 6	1, 5, 8, 9, 12, 13, 17, 21
	Fish Creek	0.94	1, 2, 8	1, 9, 10, 12, 17, 20
Jefferson River (10020005)	Fitz Creek	0.88	2, 5, 8	10
	Halfway Creek	0.71	2, 8	5, 10, 12
	Whitetail Creek	2.33	1, 2, 5, 6, 7, 8, 10, 11	6, 9, 17, 18
	Boulder River	4.20	1, 2, 4, 7, 8, 10	1, 9, 18, 19
	Basin Creek	0.04	2, 8, 9, 10, 11, 14	5, 6, 12, 14, 18
Boulder River (10020006)	Big Limber Gulch	1.55	9, 10, 11	18
	Cataract Creek	0.35	6, 7, 8, 9, 10, 11	5, 6, 14, 18
	High Ore Creek	2.12	2, 4, 8, 9, 10, 11, 14	5, 6, 8, 14, 18, 21
	Little Boulder River	0.53	2, 10	1, 8, 18, 19
	Muskrat Creek	2.66	2, 10, 11	6, 18
	NF Little Boulder River	0.11	2, 6, 7, 8	10, 12
	Nursery Creek	0.92	6, 7, 8	12, 14

Table 3-3
Impaired Water Bodies by 4th Level Hydrologic Unit Code 2005 Survey

4th Hydrologic Unit Code	Stream Segment Within BLM Land	Miles Within BLM Land	Probable Impairment Type(s) ^A	Probable Impairment Source(s) ^B
Upper Missouri River (10030101)	Beaver Creek	0.25	2, 6, 7, 8, 10, 11	9, 10, 12
	Clancy Creek	0.70	2, 8, 9, 10, 14	10, 12, 16, 18
	Confederate Gulch	1.47	1, 2, 7, 10	1, 8, 18, 19, 21
	Corbin Creek	0.07	2, 4, 8, 9, 10, 11, 14	1, 17, 19
	Crow Creek	1.05	2, 8, 10, 11	18, 19, 21
	Deep Creek	0.18	1, 2, 8	1, 4, 5, 6, 11, 13
	East Fork Indian Creek	1.98	9, 10, 11, 14	18
	Falls Gulch	1.54	9, 10	18, 19
	Golconda Creek	3.09	10, 11	18, 19
	Granite Creek	1.14	10, 14	18
	Indian Creek	4.88	9, 10, 11, 14	18, 19
	Jennies Fork	0.22	5, 6, 7, 8, 11	10, 12, 19
	Little Prickly Pear Cr	2.04	1, 2, 4, 8	1, 5, 10, 12, 14, 17
	Lump Gulch	1.89	9, 10, 11	18
	Missouri River	0.38	1, 2, 5, 6, 7, 8, 10, 11	1, 9, 10, 17, 18
	Prickly Pear Creek	0.86	2, 8, 10, 11, 14	8, 13, 18, 20
	Sevenmile Creek	0.11	1, 2, 5, 7, 8, 10, 11	6, 10, 13, 18, 21
	Silver Creek	0.03	1, 2, 9, 10, 14	1, 9, 18, 19
	Sixteen Mile Creek	1.62	2, 5, 6, 7, 8	10, 21
	Skelly Gulch	0.83	8, 14	12, 18
	Trout Creek	0.33	2, 8	5, 10, 12
	Virginia Creek	1.97	10, 11	18
	Woodsiding Gulch	2.07	5, 7	12
Upper Yellowstone (10070002)	Mill Creek	0.20	1	17
	Suce Creek	0.11	1	17
	Yellowstone River	0.27	2	5, 13
Blackfoot River (17010203)	Blackfoot River	1.90	7, 8, 10	1, 11, 18, 19
Impaired Streams Mileage on BLM Managed Lands		77.37		

^A Cause: 1= flow alterations; 2=habitat alterations (including wetlands); 3=dewatering; 4=thermal modifications; 5=phosphorous; 6=nitrogen; 7=nutrients; 8=sedimentation; 9=mercury; 10=metals; 11=lead; 12=riparian degradation; 13=suspended solids; 14= arsenic

^B Source: 1=agriculture; 2=construction; 3=land development; 4=habitat modifications (other than construction); 5=removal of riparian vegetation; 6=grazing-related; 7=pasture grazing-riparian construction; 8=highway/road/bridge construction; 9=irrigated crop production; 10=range grazing-riparian; 11=crop-related; 12=logging road construction & maintenance; 13=bank or shoreline modification & destabilization; 14=silviculture; 15=intensive animal feeding operation; 16=confined animal feeding operation (NPS); 17=hydromodification; 18=abandoned mining; 19=resource extraction; 20=placer mining; 21=channelization.

The Montana Department of Environmental Quality (DEQ) web site provides an excellent assessment database that allows for queries of specific basins. This includes maps that show water bodies, ownership, TMDL planning areas, and other landmarks. This database can be found at: <http://deq.mt.gov/cwaic/default.aspx?yr=2006>

The primary beneficial uses of water on public land include agriculture, support of wildlife, and recreation. Water use on private land within the area is primarily for agriculture and domestic activities.

There are four municipal watersheds in the Butte Field Office that have federal surface or subsurface mineral rights. They are the Missouri River Siphon, Tenmile Creek drainage, Big Hole River Intake, and Moulton Reservoir. The Tenmile Creek drainage is Helena's primary source of drinking water. Additional water is obtained, as needed, during the summer months from the

Missouri River Siphon which is located on the downstream side of Canyon Ferry Dam. The Big Hole River Intake encompasses a major portion of the Big Hole watershed upstream of the intake and is an important source of drinking water for the city of Butte. Moulton Reservoir is about five miles north of Butte and provides additional drinking water for Butte.

Municipal watersheds provide water to public water supplies which provide drinking water to municipalities. Montana is required under the 1996 amendments to the Federal Safe Drinking Water Act to carry out a Source

Water Assessment Program. The Source Water Assessment Program requires all public water systems to identify and protect their water sources. Each city public works program has local ordinances that regulate surface land use in order to protect public drinking water source(s).

Water quantity is another resource quality indicator based on whether the Proposed Action or alternatives would result in a flow or water level reduction for either surface water or groundwater resources. Criteria evaluated include water rights, beneficial uses, and ecological conditions. The PA includes portions of 15 major watersheds (4th level Hydrologic Unit Code or HUC) in west central Montana. Surface water flow data presented herein were retrieved from the U.S. Geological Survey (USGS) website (USGS 2004). Water quality data from selected surface water monitoring stations, Big Hole River, Jefferson River, Madison River, Missouri River, Yellowstone River, and Silver Bow Creek are included in Appendix E of the AMS. No specific areas of water quality problems are known in the Decision Area or PA other than the impaired water bodies identified on the Section 303(d) List. Some unspecified areas of streams, rivers, and groundwater probably have exceedences of some water quality standards due to natural or anthropomorphic conditions. Erosion and sedimentation to streams is occurring in some unspecified areas (MDEQ 2006).

A list of water rights held by BLM in the PA is found in Appendix F of the AMS. These water rights data, as well as information on basin closures and groundwater control areas, were obtained from the Montana Department of Natural Resources and Conservation (DNRC 2004a). Groundwater wells located in the PA are shown in Appendix G of the AMS. Groundwater wells monitored periodically for depth to water by the Montana Bureau of Mines and Geology (MBMG 2004) are shown on maps contained in Appendix F of the AMS.

The following subsections describe general water resources for each of the 15 major watersheds that comprise the PA (AMS Figure 2-4). AMS Figures 2-5a, 2-5b, and 2-5c show greater detail for streams, rivers, lakes, and watershed boundaries located in the northern, western, and southern portions of the PA, respectively. BLM lands are generally scattered such that relatively short stream/river reaches flow through BLM lands in most cases.

Big Hole River Basin

The Big Hole River basin is the western-most drainage basin in the southwest portion of the PA (AMS Figure 2-4). Only the north-central portion of this watershed is within the PA. Streams and rivers of this area drain south to the Big Hole River.

Major streams in the area that drain to the Big Hole River include West Fork Fishtrap Creek, Seymour Creek, Divide Creek, and Moose Creek.

Currently, the Big Hole River basin is closed to further appropriations and reservations of surface water as part of the Upper Missouri River basin legislative closure. Beneficial water use permits for groundwater can still be obtained.

Jefferson River Basin

The Jefferson River basin is one of the south central watersheds within the PA (AMS Figure 2-4). Major streams in the basin that flow into the Jefferson River include Fish Creek, Little Pipestone Creek, Big Pipestone Creek, Whitetail Creek, Little Whitetail Creek, and the Boulder River. Major lakes or reservoirs within this watershed include Delmoe Lake (Big Pipestone Creek drainage), Willow Creek Reservoir, and Whitetail Reservoir. Whitetail Reservoir is part of the water supply system for the town of Whitehall. The entire Jefferson River basin is closed to further appropriations and reservations of surface water as part of the Jefferson-Madison River basin legislative closure. Beneficial water use permits for groundwater can still be obtained.

A sediment transport study (Berger and Gammons 2004) concluded that approximately 90 percent of sediment entering Pipestone Creek is from overland flow on hill-sides and bank erosion. The largest human-caused sediment sources were due to uncontrolled runoff from gullying developed on steep hill slopes along portions of Interstate 90. Relatively minor contribution of sediment to Pipestone Creek was attributed to off-highway vehicle use.

Boulder River Basin

The Boulder River basin is the central-most watershed in the management area (AMS Figure 2-4). There are no major lakes or reservoirs in this management area. The Boulder River basin is closed to further appropriations and reservations of surface water as part of the Jefferson-Madison River basin legislative closure. Beneficial water use permits for groundwater can still be obtained.

Madison River Basin

The Madison River basin is one of the south-central watersheds (AMS Figure 2-4). Major streams in the basin that flow to the Madison River include: Beaver Creek, Elk Creek, and South Fork of the Madison River. Hebgen Lake is the major lake or reservoir in the planning district.

The entire Madison River basin is closed to further appropriations and reservations of surface water as part of the Jefferson-Madison River basin legislative closure. Beneficial water use permits for groundwater can still be obtained. A controlled groundwater area exists for the basin upstream of Hebgen Lake and was established to regulate groundwater development adjacent to Yellowstone National Park in an effort to preserve its natural hydrothermal features.

Gallatin River Basin

The Gallatin River basin originates from the Yellowstone Plateau and continues north to the confluence with the Missouri River near Three Forks (AMS Figure 2-4). Major streams in the watershed include Hyalite Creek, Bridger Creek, Taylor Creek, Hell Roaring Creek, and Dry Creek. Hyalite Reservoir is the only major lake in the basin and is part of the water supply system for the town of Bozeman.

The Gallatin River basin is closed to further appropriations and reservations of surface water as part of the Upper Missouri River basin legislative closure. Beneficial water use permits for groundwater can still be obtained.

Three controlled groundwater areas exist in or near the town of Bozeman and include the Bozeman Solvent Site, Sypes Canyon, and Idaho Pole. The controlled groundwater area adjacent to Yellowstone National Park exists within the headwaters of the Gallatin River.

Upper Missouri River Basin

The Upper Missouri River basin is the largest of the watersheds in the PA (AMS Figure 2-4). Major streams in this watershed include Deep Creek, Confederate Gulch, Avalanche Gulch, Trout Creek, Beaver Creek, Little Prickly Pear Creek, Prickly Pear Creek, Ten Mile Creek, and Crow Creek. Major lakes and reservoirs in this management area include Canyon Ferry Reservoir, Hauser Lake, Holter Lake, Lake Helena, and the Helena Valley Regulating Reservoir. These lakes and reservoirs are part of an irrigation and power generation network that constitute dammed portions of the Missouri River. In addition to these major water bodies, Chessman Reservoir and Scott Reservoir are part of the water supply system for the town of Helena. Park Lake is an alpine lake located near the Continental Divide south of Helena and used for recreation.

The Upper Missouri River basin is closed to further appropriations and reservations of surface water as part of the Upper Missouri River basin legislative closure. Beneficial water use permits for groundwater can still be obtained. Currently, the North Hills controlled groundwater area is located in the PA in the northern portion of the Helena Valley.

Upper Missouri-Dearborn River Basin

A small portion of the PA located on the north slope of the Big Belt Mountains east of Holter Lake is within the Upper Missouri-Dearborn River basin (AMS Figure 2-4). These land tracts do not directly affect any major surface water bodies.

Upper Musselshell River Basin

A small portion of the Upper Musselshell River basin drains the northeast slope of the Crazy Mountains (AMS

Figure 2-4). These land tracts do not directly affect any major surface water bodies.

Yellowstone River Headwaters Basin

The Yellowstone River Headwaters basin located upstream of the town of Gardiner drains the Yellowstone Plateau and a portion of the Absaroka Mountains in Gallatin County (AMS Figure 2-4). Major streams include Slough Creek, Buffalo Creek, Hellroaring Creek, and the Lamar River.

The headwaters of the Yellowstone River within Montana and within Yellowstone National Park are closed to further appropriations and reservations of surface water. The portion of this basin within Montana located north of Yellowstone National Park is part of the controlled groundwater area.

Upper Yellowstone River Basin

A portion of the Upper Yellowstone River basin is within the PA (AMS Figure 2-4). Major streams within this basin include Tom Miner Creek, Big Creek, Mill Creek, Trail Creek, and the Shields River. Daily Lake is the only major lake or reservoir within the basin.

A portion of this basin near the town of Gardiner is part of the Yellowstone National Park controlled groundwater area.

Shields River Basin

The Shields River basin originates from the Crazy Mountains and continues south to its confluence with the Yellowstone River near Livingston (AMS Figure 2-4). Major streams of the basin include Potter Creek, Cottonwood Creek, Muddy Creek, Flathead Creek, and Brackett Creek. Cottonwood Reservoir is the only major lake in the basin.

Stillwater River Basin

The Stillwater River basin has a portion of its headwaters within the PA (AMS Figure 2-4). There are no major lakes or reservoirs within this watershed. The Stillwater River is a major tributary of the Yellowstone River.

Approximately a third of this basin is part of the Absaroka-Beartooth Wilderness area. The headwaters of this basin near Yellowstone National Park are listed as a controlled groundwater area.

Clark Fork River Basin

Clark Fork River basin drains the portion of the PA from the Continental Divide near Butte northwest to near Georgetown Lake (AMS Figure 2-4). Streams draining north to the Clark Fork River include Basin Creek, Blacktail Creek, Browns Gulch, Silver Bow Creek, Mill Creek, Warm Springs Creek, Lost Creek, and Flint Creek.

Silver Lake near Georgetown Lake is the only major lake or reservoir in the PA. Silver Lake is part of the water supply system for Anaconda and Butte. Large ponds, constructed near Warm Springs and Opportunity, are for treatment of surface water impacted by historic mining and smelting activities.

The Clark Fork River basin is closed to further appropriations and reservations of surface water as part of the basin legislative closure. Beneficial water use permits for groundwater can still be obtained. The Butte Field Office administers only 649 acres of public land in the Upper Clark Fork River Basin.

Blackfoot River Basin

Headwaters of the Blackfoot River basin drain the northwest portion of the Butte Planning District near the town of Lincoln (AMS Figure 2-4).

Currently the Blackfoot River basin is closed to further appropriations and reservations of surface water as part of the Upper Clark Fork River legislative closure. Beneficial water use permits for groundwater can still be obtained.

VEGETATIVE COMMUNITIES

Plant communities occurring in the PA include mid-grass prairie on the driest sites (usually in valleys); fescue grasslands on slopes and foothills with higher precipitation; sagebrush, bitterbrush, and mountain mahogany interspersed in grasslands; and Douglas-fir, Rocky Mountain juniper, ponderosa pine, and limber pine communities adjacent to and encroaching into grasslands and shrublands. The cool moist conifer zone, which is composed of Douglas-fir, lodgepole pine, and Engelmann spruce communities, occupies a relatively narrow mid-elevation range in mountains. The highest and coldest elevations are characterized by communities of sub-alpine fire, lodgepole pine, Engelmann spruce, and whitebark pine. Riparian communities and wetlands occupy the wettest sites along rivers and streams and sites where water is available in plant rooting zones for a substantial part of the growing season.

Processes of Vegetation Change

Disturbances, whether human-caused or naturally occurring, affect plant communities by creating patterns of varying plant species and age classes across the landscape. Changes in plant community composition and structure and function can be relatively sudden, resulting from wildfire, floods, logging, and mining or more subtle, resulting from fire suppression, drought, insects, disease, or aging of dominant species in the canopy overstory.

Past management has contributed substantially to the vegetation condition and status of ecological succession by changing cycles and frequency of fires and susceptibility of forest vegetation to insects and disease. Prior to

European settlement in the mid-1800s, American Indians influenced the range of vegetative conditions mostly through their liberal use of fire to improve forage for horses and assist in hunting. Since the mid-1800s, agriculture, timber harvest, mining, livestock grazing, road construction, introduction of exotic species, and fire suppression have been the dominant factors of change that have shaped vegetation patterns in the PA.

Forest Insects and Disease

Reduced fire frequency in the last century has allowed forest stands to become overstocked, with a high proportion of decadent trees that are stressed from competition and recent region-wide droughts. Stress, higher densities of most forest stands, and conifer colonization of open woodlands, meadows, and grasslands and shrublands have rendered many stands susceptible to insect infestation and disease.

Insects that affect the health of trees in the PA include: mountain pine and pine engraver beetles, species that attack the pines; western spruce budworm, a species that attacks Douglas-fir and spruce; and Douglas-fir beetle, a species that attacks Douglas-fir. Mountain pine beetles typically attack the largest, oldest trees in a stand (Despain 1990). These trees are the highest value for timber and the most valuable for cavity nesting wildlife. AMS Figures 2-6, 2-7, and 2-8 depict changes in environmentally damaged trees by bark beetle infestations over a period of 20 years from 1984 to 2004. The current mountain pine beetle infestation in the planning area is epidemic and began in the year 2000 (Sturdevant 2007). Mountain pine beetle has infested over 15,500 acres of BLM lands, with the majority of infested stands in the Big Hole, Jefferson, and Missouri watersheds. For the past couple years, the planning area has received essentially "normal" amounts of precipitation, and climatologists have suggested that the long-standing drought in western Montana is now over. Although this change has been demonstrated in improved growing conditions for most bark beetle hosts and resultant reductions in beetle populations, long-term drought conditions are not easily overcome (DeNitto 2006). This is evidenced by an increase in both mountain pine beetle and western spruce budworm within BLM lands in the PA from 2005 to 2006 (USDA-FS 2005c and USDA-FS 2006a).

Similar to mountain pine beetle, western spruce budworm are influenced mainly by weather conditions. The recent drought has increased the intensity of infestation, and spruce budworm has defoliated over 91,000 acres BLM lands in the PA since 2000 (USDA-FS 2000). Budworm populations are usually highest and have the most significant effect in forests that are warm and dry, are dense with multiple crown layers, and are of poor vigor (DeNitto 2006). In 2000, only 229 acres of spruce budworm defoliation was recorded on BLM lands in the PA (USDA-FS 2000). Conversely, in 2006 defoliation was recorded on over 50,000 acres, mainly occurring on BLM lands in the Big Hole, Jefferson, and Missouri

watersheds (USDA-FS 2006a). Normally, spruce budworm does not kill trees, but reduces growth and kills tree tops. The more defoliation a tree experiences over a number of years, the higher likelihood of mortality to occur.

Larger Douglas-fir that experience heavy defoliation become stressed and thus are predisposed to be killed by attack from Douglas-fir beetle. Trees that could normally fend off bark beetle attack are weakened and then easily killed (Joy and Hutton 1990).

Douglas-fir beetle has also been slowly increasing across the BLM lands in the PA. Beetle levels are highest in the Jefferson and Missouri watersheds, with levels also currently increasing in the Big Hole due to widespread spruce budworm defoliation (Sturdevant 2007).

Recent attacks by the red turpentine beetle on ponderosa pine have also occurred in the Helena Valley, in the Jefferson watershed.

The most common forest diseases are:

- Dwarf mistletoe, the most serious and widespread disease affecting lodgepole pine in the PA and throughout its range;
- Schweinitzii root rot, in all conifer species;
- Red ring rot, mainly in pines;
- Commandra blister and western gall rust, in the pine species; and
- White pine blister rust, in whitebark pine and limber pine.

With high rates of insect and disease pathology, forest stands become much more prone to high intensity, severe fires that are stand replacing and can alter site characteristics by altering soil structure and nutrient reserves. Oliver and others (1994) report that many forest ecosystems in the northern Rocky Mountains develop naturally high levels of insect infestation and then burn severely at 100-year intervals.

Vegetation Zones

Broad vegetation zones, generally reflecting a temperature and moisture gradient, are addressed in the following section and depicted on **AMS Figures 2-9a, 2-9b and 2-9c**. The acreage of each of the vegetation zones in the PA and Decision Area is shown in **Table 3-4**.

Vegetation in the PA is predominantly grasslands and shrublands, and subalpine conifer forests. Grasslands and shrublands occupy valley floors and lower slopes, while subalpine conifer communities are present at higher elevations in mountains. The smaller areas of transitional vegetation, dry foothills/woodlands, and cool moist conifer forests reflect a relatively steep elevational gradient that results in relatively narrow zones that support vegetation intermediate in ecological requirements of grassland and shrublands and higher elevation conifer forest.

Vegetation on land within the Decision Area reflects the predominance of land managed by BLM to be present at lower elevations. Most land in the Decision Area is grassland (45 percent) and shrubland (7 percent), and conifer forests and woodlands (45 percent). Amounts of agricultural land substantially differ between the Planning and Decision Areas (**Table 3-4**) at seven percent and 0.7 percent, respectively.

Typically, the most productive agricultural land in valleys is private, whereas land managed by BLM is not as amenable to crop production. Land managed by BLM where agricultural land is present is on the recently acquired McMasters and Ward ranches. This agricultural land is currently seeded to agronomic grass species and will be managed in the future as grasslands.

Forest communities on BLM land generally do not include high elevation montane conifer forests (1 percent). The upper elevations of most land in the Decision Area support moist conifer forests, which are important for timber production and wildlife habitat when combined

Table 3-4
Acres and Percent by Vegetation Zones in the Planning and Decision Areas

Vegetation Zone	Acres in PA	% of Acres in PA	Acres in DA	% of Acres in DA
Grassland Zone	2,451,212	34	135,722	45
Shrubland Zone	313,385	4	19,658	7
Dry Foothills/Woodlands	1,091,820	15	114,926	38
Cool Moist Conifer Zone	800,387	11	21,738	7
Subalpine Fir Zone	1,305,766	18	1,796	<1
Wetland/Riparian	171,313	2	1,266	<1
Agriculture	562,017	8	2,186	1
Unvegetated	344,365	5	3,537	1
Water	77,693	1	265	<1
Urban	72,921	1	0	0
Total	7,190,879	100	301,094	100

Note: BLM surface ownership has increased to approximately 307,309 acres since release of the Draft RMP/EIS. These additional acres are predominantly grasslands/shrublands with some woodlands.

with drier mid elevation forests and forestlands adjacent to National Forest (USFS) lands.

Encroachment of conifers has been mapped in the northern part of the PA (**AMS Figure 2-10**). Within the Decision Area, most encroachment takes place in grasslands (17 percent) and shrublands (5 percent) with encroachment also occurring in riparian areas. Douglas-fir, Rocky Mountain juniper, and ponderosa pine are species most commonly invading grasslands and shrublands; whereas, Rocky Mountain juniper more commonly encroaches into riparian areas. Conifers have invaded 250,608 acres of grassland in the PA. Approximately 14,445 acres of sagebrush and 49,803 acres of grassland have conifer encroachment in the Decision Area.

Grassland and Shrubland Zone

Grasslands and shrublands are the most productive grazing land in the PA. Grasslands are an important vegetation community as they represent 34 percent of the PA and 45 percent of the Decision Area. Sagebrush is the most dominant shrubland type within the PA. Approximately four percent of the PA is sagebrush while seven percent of the Decision Area is sagebrush habitat. Sagebrush communities are dominated by Wyoming big sage, mountain big sage, rubber rabbitbrush, skunkbush sumac, and greasewood. Wyoming big sage tends to grow within the mid to low elevations on the drier sites, while mountain big sage occurs in upper elevations under moister conditions.

Native grasslands occupy 135,722 acres of the Decision Area on a variety of topographical positions, from level valley floors, to alluvial benches, and foothills, to dry mountain slopes. Grasslands in valleys and lower toe slopes are dominated by cool-season grasses and sedges which include needle-and-thread, western wheatgrass, prairie junegrass and Sandberg's bluegrass. The warmest and driest grasslands also may have warm season species such as blue grama, prairie sandreed, sand dropseed, or red threeawn. Shrubs are minor components of these grasslands.

Grasslands in the PA have floristic components of the Mixed-Grass Prairie of the Great Plains (western wheatgrass, needle-and-thread, blue grama) and the Palouse Prairie of the Pacific Northwest (e.g., bluebunch wheatgrass, Idaho fescue, western needlegrass, and rough fescues). In general, the warmer, dryer sites, often with heavier soils, support grasslands dominated by sod-forming species typical of the northern Great Plains; whereas the higher elevation, cooler grasslands are dominated by bunchgrasses with floristic affinities with the dry regions of eastern Washington.

Typically, sod-forming grasslands east of the Continental Divide historically were subjected to heavy grazing pressure from bison and other native ungulates; whereas bunchgrasses with origins in the Palouse Prairie farther to the West received much lighter grazing pressure from native ungulates. West of the Continental Divide, bison

were relatively scarce or absent; consequently, sod-forming grasses have evolved to be more resistant to heavy livestock grazing and trampling than are bunchgrass-dominated communities. Dominant bunchgrasses such as bluebunch wheatgrass, Idaho fescue, and rough fescue are considered "decreasers", meaning that they decline in vigor and distribution with extended periods of heavy grazing by livestock.

Additionally, grasslands composed of sod forming species tend to be more resistant to the invasion and spread of noxious weeds and other invasive species. Bunchgrass communities have areas of unvegetated soil between bunches of grass, which is susceptible to colonization by noxious weeds. Many of the bunchgrass communities in the PA have been infested with noxious weeds including spotted knapweed, leafy spurge, and Dalmatian toadflax.

At the upper elevation contacts of grasslands with forest communities and woodlands, encroachment by conifer species into grasslands is taking place as a result of fire suppression. Prior to effective fire suppression, foothill grasslands were maintained free of invading trees and shrubs by periodic fires. With successful fire suppression over the last century, many grasslands are becoming woodlands or shrublands, with an associated loss of habitat features provided by grasslands (e.g., livestock and wildlife forage, especially on big game winter ranges; and breeding sites for wildlife adapted to grasslands). Additionally, increased tree and shrub growth increases the risk of high severity fires that would alter soil and vegetation characteristics, increasing the risk of invasion by noxious weeds.

Most grass communities are adapted to frequent fire intervals (USDI-BLM 1993, Lehman 1995 and Heyerdahl et al. 2006). Bluebunch wheatgrass and Sandberg's bluegrass, respond well after fire, including stand-replacing fires. Needle-and-thread does not regenerate after summer burns, which kill root crowns. Response of Idaho and rough fescue to fire varies based on plant vigor, amount of residual litter, and season of burn (USDI-BLM 2003a).

In native grasslands, historically frequent fires burned quickly and did not severely heat the soil and remove protective plant cover. With the addition of woody fuels from encroachment of trees and shrubs, the potential for very hot fires that burn duff and litter down to mineral soil has increased. With the exposure of mineral soil, reproduction of conifers is facilitated, which initiates a type conversion, from grassland to woodland, which may not be reversible with practical management. Conifer species require mineral soil for successful seed germination and growth and do not become established as quickly in intact grasslands.

The most extensive shrublands in the PA are dominated by two types (i.e., subspecies) of big sagebrush (i.e., Wyoming big sage and mountain big sage). There are

19,658 acres of shrub-dominated communities in the Decision Area. It is important to distinguish between the two subspecies because they have ecological differences that are relevant to management. These two forms of big sagebrush differ in their moisture requirements, seed germination characteristics, and importance to wildlife (Morris *et al.* 1976; Tisdale and Hironaka 1981). Wyoming big sage grows on drier sites, on shallow soils in the 8 to 12 inch precipitation range. This subspecies is most common on valley floors and lower slopes in the Three Forks-Townsend area and in the vicinity of Butte, eastward through the PA (Morris *et al.* 1976). Wyoming sagebrush is preferred by sage grouse.

Mountain big sage is most common in the Helena and Shields River valleys, above 6,000 feet elevation, where it contacts the forest margin and high elevation fescue grasslands. Mountain big sage tends to more readily reestablish itself after fire and on sites of disturbance (e.g., road cuts, rodent diggings, and abandoned fields) than Wyoming big sage (Morris *et al.* 1976).

Other important shrubs often growing in association with big sagebrush include rubber rabbitbrush, skunk-bush sumac, greasewood, spineless horsebrush, low sage, silver sage, bitterbrush, and shrubby cinquefoil. Serviceberry, chokecherry, wild rose, and species of gooseberry and currant are common on sites with elevated moisture such as ravines and cooler slopes. Common understory species include western wheatgrass, Sandberg's bluegrass, Great Basin wildrye, squirreltail, Indian rice grass, and western needlegrass. Forbs are generally abundant in big sagebrush communities.

Big sagebrush communities occur on a variety of slopes, exposures, and soil types. On the driest sites, bluebunch wheatgrass is the dominant grass, with rough fescue and Idaho fescue becoming more common with increasing moisture. Fringed sage, broom snakeweed, prickly pear cactus, blue grama, and junegrass are usually conspicuous understory species on drier sites. On moister sites, pussytoes, yarrow, chickweed, and buckwheat are common associates (Mueggler and Stewart 1980).

Low sagebrush is one of the driest shrubland types occurring in western Montana (Mueggler and Stewart 1980), usually growing on south and west exposures, on dry, rocky soils. Low sagebrush communities usually do not form extensive landscape-level stands, but are usually part of larger big sagebrush mosaics. Grasses, such as bluebunch wheatgrass, needle-and-thread, and Sandberg bluegrass dominate the undergrowth. Non-native annual grasses, such as cheatgrass and Japanese brome, may also be present. Common herbaceous species include Hood's phlox, blue flax, lupine, and fringed sage.

The fire history of shrublands has not been firmly established, but fire was probably uncommon on drier sites because of sparse fuels, and more frequent, averaging 32 to 70 years on moister sites with greater herbaceous production (USDI-BLM 2003a). Big sagebrush and low

sagebrush are sensitive to fire and do not sprout from root crowns following fire (Howard 1999 and McMurray 1986). Amounts of grass and other vegetation to sustain fire is directly related to the amount of moisture available, consequently, drier sites occupied by drought-tolerant Wyoming big sage and low sage tend to have the least frequent fire return interval (100 years or more between fires) (USDI-BLM 2001). Moister mountain big sage communities are more likely to be growing in association with continuous grass and forb species that can carry fire. Fire return intervals in basin big sage and mountain big sage communities tend to be much more frequent, less than 50 years (Johnson 2000).

Non-lethal and mixed severity fires may burn in a mosaic pattern, leaving clumps of live sagebrush. Common sub-dominants in sagebrush communities, rubber rabbit brush, and spineless horsebrush sprout from root crowns following fire. These species tend to reoccupy burned sites more quickly than big sagebrush, but over time become decadent in absences of periodic fire.

Fire return intervals in sagebrush communities are influenced to a large extent by amounts of herbaceous fuel available to carry fire. Livestock grazing has probably influenced fire return intervals especially on sites where little herbaceous biomass has accumulated. Invasion of sites by non-native cheatgrass also has the potential to substantially alter fire cycles. Cheatgrass is extremely flammable causing stands to burn with much greater frequency, as often as every few years. With drastic shortening of fire return intervals, sagebrush can be effectively eliminated and replaced by grassland dominated by cheatgrass, rabbit brush, and fire-resistant forbs, often invasive species. This type of conversion is common in the Great Basin but is not yet prevalent in the Butte PA.

As with grassland habitats, sagebrush communities within the Planning Area are also experiencing an increase in conifer species. Douglas fir and other conifer species most likely encroached into sagebrush and grasslands in the past but surface fires were probably frequent enough to kill many of these trees before they reached fire-resistant size (Heyerdahl *et al.* 2006). Heyerdahl *et al.* (2006) found that prior to 1855, fires occurred frequently enough in southwest Montana to limit Douglas fir encroachment (establishment) but not so frequently that they eliminated mountain big sagebrush. These fires are also suspected to have burned in a mosaic pattern across the landscape, retaining a seed source for the reestablishment of sagebrush. Johnson *et al.* (2006) found several studies that reported declines in shrub (including sagebrush) and herbaceous vegetation throughout the Intermountain West as juniper increases in dominance.

Bitterbrush is more common west of the Continental Divide, but it is present in PA, usually as small patches of only a few acres, generally restricted to rather dry, rocky, southern exposures (Mueggler and Stewart 1980). Bitterbrush is palatable to livestock and wildlife, being

especially important on big game winter ranges. Bitterbrush is usually found in association with dry site Douglas-fir, ponderosa pine, bluebunch wheatgrass, Idaho fescue, and rough fescue.

Bitterbrush is more resistant to grazing early and late in the season than during summer. Plants heavily grazed early in the season tend to produce more biomass than plants grazed at moderate intensity late in the growing season. Plants grazed during dormant periods recover much more quickly than plants grazed during the peak of the growing season (McConnell and Smith 1977).

Bitterbrush is generally considered susceptible to fire, often taking 15 to 30 years to recover following moderate to severe fires; however, the potential to sprout after fire is variable depending on fire severity and season, genetic composition, carbohydrate reserves, and age. Bitterbrushes growing in association with plant communities that have relatively frequent fire intervals tend to sprout more frequently than bitterbrush growing on sites where fire has been excluded for long periods (Agee 1994). Low intensity, high frequency fires favor regrowth from sprouting, whereas higher intensity, less frequent fires favor regeneration by seed.

Curlleaf mountain mahogany dominates communities that typically occupy hot, dry rocky and limestone soils or rock outcrops on slopes. It is one of the few species that meet the protein requirements for wintering deer and is heavily favored by bighorn sheep in summer. Wyoming big sagebrush, rubber and green rabbitbrush and juniper are often present in mountain mahogany communities. Bluebunch wheatgrass dominates the undergrowth; needle-and-thread may be present in varying amounts.

Mountain mahogany often forms dense, closed-canopy stands that have little understory or interspecific competition. Where ponderosa pine and Douglas-fir are also present, mountain mahogany may eventually be overshadowed by tall trees and be shaded out (Ross 1999). Typically, seed production is episodic, often producing copious amounts of seed that germinate under the canopy of mature plants but then die from damping off. Mountain mahogany usually germinates and becomes established on bare mineral soil. The increase in cheatgrass and other invasive species has inhibited reproduction of mountain mahogany in some areas of the West. Mountain mahogany is usually killed by fire, even fires of low intensity, and does not resprout (Ross 1999). Closed, mature stands may not have sufficient understory to carry fire, so fire-induced mortality may be confined to edges of stands. Regeneration by seed may occur after fire if the soil is not rapidly colonized by other competitive plants.

Factors other than fire that can cause extensive mortality include attack by sapsuckers and other woodpeckers, which attack intermediate age class trees and girdle the stems (Ross 1999).

Dry Foothills/Woodlands Zone

The zone is a transition area between the dryer Grassland and Shrubland Zone and the Cool Moist Conifer Zone. This zone has historically been characterized by relatively open stands of limber pine, Rocky Mountain juniper, ponderosa pine, and Douglas-fir on rocky, dry slopes. The relative proportions of these species vary depending on site conditions and fire history (Arno 1980), ranging from mixtures of all four species to stands dominated by one or two species. BLM forest inventory compiled in 2005 for the Decision Area clearly shows that the dry forest types continue to mature in a heavily overstocked condition that is unhealthy, declining in productivity, and unsustainable. These forest stands are crowded, averaging 600 to 700 trees per acre with many sampled stands having well over a 1,000 trees per acre. These stocking levels are indicative of a high potential for insect epidemic and/or large-scale disturbance events with severe effects similar to those that occurred recently with the wildfires of 2000. Stands with these high stocking levels are also undergoing bark beetle infestations and the widespread western spruce budworm defoliation now being seen in many areas. The impacts from these past events are expected to be long-term as well, with deforestation occurring on approximately a quarter to a half of severely affected stands.

Conifer species in this zone are not as productive for timber or fiber because the trees are usually slow growing, often have branches and limbs growing in the lower boles, and are more costly to handle when removed for commercial harvest reducing economic returns when compared to timber harvesting in the higher elevation zones. Many of these forested areas produce high volumes of woody materials suitable for biomass or other forest products. This zone is often important for fire wood gathering, Christmas tree cutting, and recreation because it is easily accessible to many urban areas. Dry foothills and woodlands occupy approximately 15 percent of the PA and 38 percent of the BLM land within the Decision Area.

This zone is important seasonal and year-around wildlife habitat, often being part of big game winter range and year-round habitat for species that occupy the higher elevation forest communities in summer and lower elevation grasslands and shrublands. This zone is especially important for wolves and mountain lions, if elk or deer, their primary prey, are present.

Plant communities in this zone tend to be composed of relatively open stands of small, slow-growing trees with understories of bunchgrass. Plant communities in this zone are susceptible to invasion by noxious weeds because forest overstory cover is not sufficiently dense to shade out invasive weeds and the bunchgrass component does not compete well with weeds because of the prevalence of unvegetated areas among the relatively evenly dispersed bunchgrass clumps.

Of the conifers present in this zone, Rocky Mountain juniper appears to have the widest ecological amplitude, growing admixed with ponderosa pine and Douglas-fir at higher elevations and extending into riparian areas along the Jefferson, Madison, Gallatin, and Missouri Rivers. It forms nearly pure stands on some sites in the PA.

Juniper is important to wildlife, being a major source of forage for mule deer in winter. Juniper berries are an important food for small mammals and birds, especially waxwings. This shrubby tree is important nesting habitat for a variety of birds including chipping sparrow, robins, song sparrows, and sharp-shinned hawks (Scher 2002). Fire is a major factor controlling the distribution of woodland conifer species such as Douglas-fir, ponderosa pine, limber pine and juniper. Limber pine, juniper, and smaller conifers are readily killed by low intensity burns because of its dense lower branches with a high volatile oil content and thin bark. Juniper does not sprout after top-kill by fire, with post-fire establishment from seed. Prior to the late 1800s, more frequent fires probably maintained low densities of woodland conifers, often restricting conifers to rocky sites without sufficient fuel to carry fire. Dry Douglas-fir/ponderosa pine stands historically underwent low to moderate severity fires approximately every 5 to 20 years (Fischer and Clayton 1983). Fire maintained these stands open in structure with grass understories. Currently, most of these stands are overstocked with trees and have a closed canopy with little to no grass in the understory.

Limber pine communities grow on some of the driest sites capable of supporting trees, generally on shallow, rocky soils derived from limestone. On the driest sites, bluebunch wheatgrass is a dominant understory species with rough fescue and Idaho fescue becoming dominant with increasing moisture (Pfister *et al.* 1977). Within the DA there are approximately 7,560 acres of limber pine interspersed with Douglas-fir and ponderosa pine.

Limber pine is of low commercial value due to its growth characteristics and wood quality. The foliage of limber pine is largely unpalatable as a browse species for wildlife; however, its large high-energy seeds are an important food for birds and small mammals. Clark's nutcrackers cache seeds from limber pine, which are often found and eaten by bears.

Limber pine is especially susceptible to five-needle pine blister rust. Stands that are infected with this fungal pathogen often experience 75 to 95 percent mortality (Johnson 2001). Although infection by blister rust has not decimated populations of limber pine in the PA, extensive limber pine communities along the Rocky Mountain Front north of Helena are experiencing large-scale mortality.

Young limber pines are susceptible to low-severity fires because of their thin bark and low branches that can rapidly carry ground fire to the crown. Older trees, some

more than 500 years old, are more resistant to fire because they develop thick bark and few branches near ground level. Open savannah-like communities of Douglas-fir and ponderosa pine adapted to dry conditions occupy sites at upper elevations of grasslands and shrublands. These open stands are important to wildlife species such as flammulated owls, which utilize large snags for nesting habitat. Ponderosa pine communities are present on 16,600 acres in the Decision Area while dry Douglas-fir communities are present on 90,700 acres. At the interface of the dry conifer and grassland/shrubland communities, Douglas-fir and ponderosa pine are increasing in density and expanding into areas previously dominated by grasses and shrubs. Fire had been a primary factor in shaping the species composition and stand structure (e.g., canopy layers and dominance of trees and shrubs), but fire suppression has allowed conifers to grow into these areas. Approximately 14,500 acres of shrubland and 49,600 acres of grasslands are encroached with conifers in the PA. Increased density and expansion of conifers reduces the density and vigor of sagebrush and grasses through shading and competition for nutrients and water. Common species associated with ponderosa pine and dry site Douglas-fir stands include ninebark, pinegrass, bluebunch wheatgrass, ponderosa pine, elk, sedge, common juniper, skunkbush sumac, bitterbrush, chokecherry, spirea, rough fescue, and mountain snowberry. In the past, frequent low-intensity fires maintained the high cover of grasses and sprouting shrubs, with lower cover of fire-sensitive sagebrush species.

Conifer encroachment into grasslands and shrublands has expanded because of decreased intervals of fire.

This zone is important from a fire management perspective because it is often part of the wildland-urban interface that separates forests with a high-fire potential from urban and residential areas where fires and smoke pose a risk to human health and property. Conifer species in this zone often encroach into grasslands and shrublands tending to exacerbate the threat of wildfire. **Table 3-5** shows size class and density of dry forest types by 4th field HUC within the Decision Area.

Cool, Moist Conifer Zone

The cool, moist conifer zone represents approximately 11 percent (800,387 acres) of the PA and seven percent (21,738 acres) of the Decision Area. Cool moist conifer communities are the most productive timber-producing forest type in the PA. They also are important summer and fall habitat for elk, deer, black bears, small mammals, migratory birds, and woodpeckers. Large Douglas-fir snags in this forest zone are important denning and nesting sites for cavity-nesting birds and mammals.

The majority of this zone is dominated by lodgepole pine and Douglas-fir with lesser amounts of Engelmann spruce and subalpine fir on colder and moister sites, usually at the higher elevations, or extending downslope in cold-air drainages. Douglas-fir occupies the lower

Table 3-5
Size Class and Density of Dry Forest Types in the Decision Area

	Dry Douglas-fir Medium and Large Size Class High Density		Ponderosa Pine Medium and Large Size Class High Density		Ponderosa Pine and Douglas-fir Medium and Large Size Class Low Density		Limber Pine All Sizes and Densities		Ponderosa Pine and Douglas-fir Seedling Sapling and Pole Class All Densities	
Watershed	Current	Historic¹	Current	Historic¹	Current	Historic¹	Current	Historic¹	Current	Historic¹
Big Hole	13,733	6,690	0	78	5,272	3,010	10	60	890	3,247
Blackfoot	0	86	0	0	368	78	0	0	0	0
Gallatin	400	61	0	0	133	13	0	0	0	0
Jefferson	19,123	4,875	64	39	8,484	3,337	3,199	405	1,066	3,479
Missouri	23,200	5,597	10,773	1,368	17,502	4,692	4,290	338	4,223	6,352
Yellowstone	1,331	248	0	0	800	228	65	0	0	287
Total	57,787	17,557	10,837	1,485	32,559	11,358	7,564	803	6,179	13,365

¹ Historic acres were derived from modeling vegetation conditions over a 500-year period using the SIMPPLLE model, run approximately 30 times, to determine "average" historic condition. See **Appendix D** for more details.

elevations of this zone in association with understory shrub and forb dominants including blue huckleberry, heart-leaf arnica, kinnikinnick, beargrass, twinflower, and elk sedge (Pfister *et al.* 1977). These forest vegetation types are also maturing with higher stocking densities as indicated by the forest inventory compiled in 2005. Across the Decision Area, these forests have very low percentages of young stands due in part to successful fire protection in the past and limited treatment activities over the last planning cycle. They are also subject to an increasing potential for insect outbreak as they continue to age and overstory canopies continue to close with the ground vegetation continuing to decline. Moist Douglas-fir communities are present on 5,053 acres of the DA. Lodgepole pine thrives following disturbances such as fire, logging, and insect infestation and is relatively short-lived, becoming decadent in absence of periodic replacement regimes that initiate reproduction. Lodgepole pine is present in the PA as nearly pure stands or intermixed with other conifers. Even aged, single-storied stands occur where favorable fire, seed, and climatic conditions have combined to produce large numbers of seedlings at one time. Dwarf mistletoe is a common disease in many lodgepole stands in the DA. Lodgepole pine communities are present on 16,481 acres of the DA.

Lodgepole pine has a broad ecological range, growing in habitats such as frost pockets, soils with high water tables, and soils low in fertility. Typically, lodgepole pine is a seral or pioneer species and is eventually replaced by Douglas-fir or subalpine fir; however, on some sites lodgepole pine may be a climax species, meaning it persists over a long period of time and is not replaced by other tree species. Typical associates of lodgepole pine include pinegrass, elk sedge, beargrass, twinflower, blue huckleberry, and grouse whortleberry (Pfister *et al.* 1977). Forest communities in this zone are susceptible to severe, stand-replacing wildland fire. Following fire, lodgepole pine often becomes the dominant tree species because of the proportion of serotinous,

fire resistant cones found in the PA that can hold high numbers of viable seeds for twenty years or more, which often survive intense crown fire such as those seen in Yellowstone Park in 1988. Lodgepole pine also has a high rate of seedling survival, rapid growth of young trees, early seed production, prolific seed production, and high seed viability (Anderson 2003).

Currently, this zone has a higher density of sub-dominant trees in the understory and higher levels of fuel than with conditions prior to the early 1900s and, consequently trees are stressed and vulnerable to insects and high-severity, stand-replacing fires.

In cool moist Douglas-fir areas high-fuel conditions have developed as a result of fire suppression and insect infestations in this zone. Instead of having mixed intensity fires that occur every 30 to 60 years and are typical of moderate severity fire regimes (Agree 1998), the risk of high-intensity, large scale fire has greatly increased in this zone over most of the PA. High-intensity, stand-replacing fires can adversely affect many resources such as soils, water quality, wildlife, noxious weed invasions, and fisheries, including threatened and endangered species.

Fire management in cool, moist forest types is addressed by Crane and Fisher (1986). They state that protection from unwanted fire is a major fire management consideration in stands where ignition of live and dead fuels could result in severe fire behavior. It may be difficult and impractical to abate the fire hazard and reinitiate normal fire intervals in such stands except in conjunction with timber harvest operations and other mechanical treatments. Fiedler (1996) suggested that prescribed fire in dense stands or those with understory ladder fuels could fatally damage the already stressed overstory trees. Logging and thinning might be appropriate pre-burn treatments before prescribed fire can safely be introduced into dense forests.

Subalpine Fir Zone

Subalpine fir and Engelmann spruce communities occupy the highest, coolest elevations in the PA. Subalpine fir communities are present on 1,796 acres of the Decision Area.

They have minor importance for timber production and grazing, but are important hydrologically and for wildlife habitat. High snow accumulations in this zone provide most of the seasonal runoff in rivers and streams and recharge groundwater aquifers that provide base flow during the driest parts of the summer. Plant communities in this zone are important habitat for pine marten, boreal owl, lynx, wolverine, elk, mule deer, grizzly bear, black bear, blue grouse, Clark's nutcracker, and migratory birds. This community occupies 18 percent (1,305,766 acres) of the PA but only one percent (1,796 acres) of the DA.

Table 3-6 shows size class and density of cool moist and subalpine fir forest types by 4th Field Watershed within the Decision Area. This zone, dominated by subalpine fir, Engelmann spruce, lodgepole pine, and whitebark pine, extends from the cold limits of Douglas-fir upslope to timberline. Above the elevational cold limit of lodgepole pine (9,850 feet) Engelmann spruce and subalpine fir often co-dominate to form extensive forests to the upper limit of tree growth. Spruce and subalpine firs are extremely cold hardy and at timberline both species develop low-growing gnarled growth forms, known as krumholtz. Common understory species in this zone include pinegrass, elk sedge, beargrass, twinflower, blue huckleberry, and grouse whortleberry.

Spruce requires a mineral soil seedbed for successful establishment; subalpine fir is able to establish in duff and litter because of its rapid root growth. Consequently, subalpine fir seedlings usually outnumber spruce/fir stands even where spruce dominates the overstory. Spruce and subalpine firs are very fire sensitive and are

generally killed even by low-intensity fires. Typically, forests in this zone experience stand-replacing fires at intervals of about 150 years (Uchytel 1991). Lodgepole pine ecology in this zone is similar to its ecology in the lower moist, cool conifer communities.

Infrequent stand-replacing fires are necessary to maintain whitebark pine in early to mid-seral stands because of the rapid rate of ecological succession (Howard 2002).

Lodgepole pine often forms single-species, even-aged stands following fire. In areas where spruce is abundant and lodgepole pine is scarce before fire, spruce rapidly establishes if adequate numbers of seed trees are present in adjacent unburned areas. If lodgepole pine is present in the preburn community, it usually becomes dominant, overtopping spruce seedlings; however, because spruce seedlings are shade tolerant, they usually survive and eventually become the largest trees in the stand in the absence of fire (Uchytel 1991).

Whitebark pine generally grows on cold, moist sites, often exposed, rocky ridges near timberline. Regeneration is dependent on Clark's nutcrackers, which remove the large seeds and bury the seeds in shallow caches, usually in open areas and burns, for future food. During years of good seed production, Clark's nutcrackers cache more seeds than they consume, with unretrieved seeds germinating to become new trees (Howard 2002).

Whitebark pine communities experience frequent fires as a result of lightning strikes on exposed, windswept ridges; however fires usually do not spread and are low intensity because of discontinuous canopies and sparse understory fuel.

Natural regeneration of whitebark pine is affected by five-needle pine blister rust, fire exclusion, bark beetles, seed predation, and fungal disease, with the greatest threat being posed by blister rust. Seed predators include Clark's nutcrackers, ravens, chipmunks, red squirrels,

Table 3-6
Size Classes and Density of Cool and Moist and Subalpine Fir Forest Types in the Decision Area

Watershed	Cool and Moist Forests Medium and Large Size Classes – High Density		Cool and Moist Forests Medium and Large Size Classes – Low Density		Cool and Moist Forests Seedling, Sapling, and Pole Size Classes – All Densities	
	Current	Historic ¹	Current	Historic ¹	Current	Historic ¹
Big Hole	5,533	2438	1,320	NA	4,335	4,384
Blackfoot	0	46	460	NA	0	0
Gallatin	0	0	0	NA	0	0
Jefferson	1,493	1518	232	NA	610	549
Missouri	6,187	4262	1,153	NA	1,097	1,174
Upper Clark Fork	262	0	0	NA	0	0
Yellowstone	551	158	301	NA	0	0
Total	14,026	8,422	3,466	NA	6,042	6,107

¹ Historic acres were derived from modeling vegetation conditions over a 500 year period using the SIMPPLLE model, run approximately 30 times, to determine "average" historic condition. See **Appendix D** for more details.

pine grosbeaks, grizzly bears, and pocket gophers. Whitebark pine communities are present on less than 30 acres of the Decision Area.

Wetlands and Riparian Communities

A riparian zone is the swath of land adjacent to a river or stream and is the transition area between terrestrial uplands and the stream. The size of the riparian zone will vary depending on the landscape. It may be a small corridor of vegetation immediately adjacent to the stream or a large network of wetlands.

There are 346 miles of rivers and streams with associated riparian vegetation in the Decision Area. Riparian areas and associated wetlands are some of the most important habitats in the PA for providing ecological functions and values. Riparian areas are the green strips bordering springs, streams, and other bodies of water. They include wetlands, stream channels, and vegetation adapted to soil and moisture conditions transitional between uplands and wetlands. These areas support the highest densities and diversity of breeding birds, including bald eagle, great blue heron, Swainson's hawk, waterfowl, red-tailed hawk, owls, and numerous migratory birds. Riparian areas provide crucial habitat for furbearers such as otter, beaver, mink, and muskrat; white-tailed deer; moose; ring-necked pheasant; red fox; and coyote. Riparian and wetland areas are especially important to the livestock industry. Livestock tend to congregate in wetland and riparian areas and utilize the vegetation more intensely than on adjacent upland sites. Riparian areas and wetlands often produce 10 to 15 times the amounts of forage compared to drier upland sites.

Grazing can have substantial effects on vegetation and soils, resulting in decreased vigor and biomass and alteration of species composition and diversity. Improper grazing of riparian areas can affect the streamside environment by changing and reducing riparian vegetation. Channel morphology can be changed through: widening the streambed, making it shallower; alteration of water flows and velocity; and, decreases in water quality. Water quality changes associated with improper grazing include increased water temperatures, nutrients, suspended sediments, and bacterial counts.

One of the most extensive human-caused influences on riparian zones in the western United States has been grazing (Ehrhart and Hansen 1998). Livestock grazing has been implicated in declining reproduction of cottonwood and aspen communities and degradation of water quality in streams supporting cold-water biota. Extensive livestock grazing can result in a decline in the recruitment of woody species, a reduction in understory diversity, increased erosion, changes in the channel morphology and degraded water quality.

The BLM manages grazing in riparian areas through seasonal constraints on cattle numbers and times of access and through fencing and placement of water

sources and salt in upslope areas to encourage movement of livestock away from riparian areas.

Riparian areas also are critical for stabilizing streambanks and shading to reduce water temperatures of streams that support trout and other cold water species. Sediment generated from streambank erosion is an important source of water quality impairment.

Roads in the PA often are within or close to riparian areas, which can adversely affect these areas by vegetation removal, dust generation, sediment delivery to streams and associated wetlands, fragmentation, by preventing channel migrations, and by increasing human activities such as camping and OHV use. Historic mining has often included dredging and other techniques that have altered riparian areas and streams. Riparian areas can also be degraded by noxious weed infestations and recreational activities.

Wetlands are regulated under Section 404 of the Clean Water Act as a subset of Waters of the U.S. Wetlands are defined as areas that are inundated or saturated by surface water or groundwater at frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (U.S. Army Corps of Engineers 1987). Wetlands can consist of herbaceous species, shrubs, and trees.

Riparian shrub communities typically are dominated by red-osier dogwood, willows, and water birch. Douglas-fir and juniper colonize the drier margins and terraces of riparian areas in the absence of frequent flooding.

Currently, riparian vegetation conditions in the Decision Area vary from healthy native vegetation to severely impacted stands with the majority of plants being introduced species. In degraded riparian areas, disturbance processes (such as frequent flooding), which create and maintain riparian communities have been altered and fire is infrequent. As a result there are larger numbers of conifers, especially Rocky Mountain juniper, in valley bottoms and aspen, willow, and cottonwoods are decadent and do not reproduce effectively.

Heavy browsing and trampling by livestock and wildlife have stressed localized areas of riparian vegetation and contributed to streambank instability and delivery of sediment to streams. The role of beavers in creating higher water tables by dam construction and regenerating woody species has been eliminated or reduced in many areas.

In some riparian areas, the loss of water storage from beaver dams and/or the loss of riparian vegetation have changed site potentials and vegetation adapted to drier conditions has increased. Consequently, species adapted to drier site conditions have become more prevalent (e.g., Kentucky bluegrass, streambank wheatgrass, silver sagebrush, and shrubby cinquefoil).

BLM has developed a protocol for determining proper functioning condition of riparian areas. This protocol entails field observations of hydrologic, vegetative, and erosional attributes that indicate functional status of riparian communities. Hydrologic attributes include flow regimes, flood frequency, presence of beaver dams, sinuosity, width/depth ratios, gradient, and riparian zone width. Vegetation attributes include composition, age structure, indicator species, root masses, bank cover, vigor, and woody debris recruitment potential. Erosion attributes include floodplain and channel characteristics, point bar cover, lateral stream movement, stability, and water/sediment balance.

Riparian areas are considered functioning properly when they have adequate vegetation and landforms to:

- Dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve flood-water retention and groundwater recharge; or
- Develop root masses and stabilize streambanks against cutting action.

Areas are considered functional—at risk when they are functioning properly to some degree but existing soil, water, or vegetation conditions make them susceptible to degradation. Nonfunctioning riparian areas are identified when conditions are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows.

For fire and fuels management projects, BLM has developed a Riparian Management Zone (RMZ) Strategy (USDI-BLM 2003a) for forested and non-forested riparian areas. Boundaries of RMZs around ponds, lakes, and perennial streams in forested habitat generally would be the width of one site-potential tree height (two site-potential tree heights for waters with special status fish species). In non-forested rangeland ecosystems, RMZs extend to the edge of riparian vegetation; extent of seasonally saturated soil; or to the extent of moderately and highly unstable areas; or if trees are present, the width of one site-potential tree height.

Of the 346 miles of riparian vegetation along rivers and streams in the DA, 150 miles (43 percent) are in proper functioning condition, 147 miles (42 percent) are functioning at risk, 40 miles (12 percent) are non-functional, 1 mile (less than one percent) are unknown, and 8 miles are woody draws (2 percent).

Cottonwood

Black cottonwood is a common overstory species in riparian communities along rivers and larger streams with common shrubs including western snowberry, serviceberry, red-osier dogwood, and wild rose.

Cottonwood communities in the PA are most extensive along the Missouri, Gallatin, and Jefferson Rivers, and other perennial streams. Cottonwood communities occupy riparian zones of rivers and streams that have periodic over-bank flooding. Riparian plant communities are "pulse-stabilized" systems maintained in continual ecological transition (disclimax) through the pulse of periodic flooding. Scouring by floodwaters and deposition of water-borne sediment (alluvium) creates optimum habitat for seedlings of cottonwood and willow species. Seeds of these species germinate almost exclusively on recently deposited, fully exposed alluvium.

According to Mahoney and Rood (1993), the following factors are important for cottonwood seedling establishment: 1) peak flows to prepare germination sites; 2) receding flows at the time of seed release to expose new germination sites; 3) gradually declining water table to limit seedling drought stress and promote root growth; 4) adequate summer flows to meet high water demands; and 5) adequate autumn flows to maintain water balance and over-winter survival. A detailed discussion of life history, ecology, and conservation of North American cottonwood forests is presented by Braatne and others (1996), Johnson (1992), and Hansen and Suchomel (1990). Fluvial processes, associated with establishment and maintenance of riparian forests, are discussed by Scott and others (1996).

Black cottonwood is frequently damaged by low-severity fires, with young trees with thinner bark being more susceptible. Following fire, black cottonwood sprouts from stumps, root crowns, and lateral roots (Steinberg 2001). Rate of sprouting is highest when plants are dormant, and in young plants. Sprout survival is highest when the water table is near the surface. Fire can improve regeneration from seed by increasing light penetration and exposing mineral soil. Exposed mineral soil is essential for successful reproduction from seed.

Aspen

Aspen has historically occupied moist sites from the upper margins of grasslands and shrublands, extending well into the higher Cool Moist Conifer Zone. Aspen is intolerant of shade and grows in even-aged, single-storied stands. Aspen is relatively short lived, usually maturing in 60 to 80 years, followed by a rapid decline in vigor with increased susceptibility to disease. As aspen stands mature and decline in growth and vigor, conifers begin to dominate the sites. Without fire, logging, or some other disturbance, aspen does not effectively reproduce (DeByle and Winokur 1985).

Aspen stands are relatively rare in Montana when compared to the other Rocky Mountain States, but where they occur they support a diverse avifauna. Large stands of pure aspen can be found in southwestern Montana, primarily on the Beaverhead-Deerlodge and Gallatin National Forests and in the Beartooth Mountain portion of the Custer National Forest. It is often the only broad

leafed tree within coniferous forests and therefore provides unique foraging substrates for a variety of insectivorous birds. Its suckers, twigs, and bark are used by wintering ungulates, particularly deer, elk, and moose. Snowshoe hares and cottontail rabbits feed on its twigs and buds, while ruffed grouse are highly dependent on aspen buds in winter. Aspen also provides cavities and snags for cavity dependant wildlife.

Aspen trees are in poor condition over most of Montana. Most of the aspen remaining in the state are in the older age classes and are in critical need of regeneration. Older stands are usually less vigorous and least likely to regenerate successfully. Many of these stands are currently being crowded out by competing conifers and aspen and will eventually be lost from the site. In addition, pure and mixed stands in the older age classes are of low vigor and are often heavily infested with pathogens. Effective fire suppression over the past 50 years has permitted competition and disease to reduce clone vigor to levels lower than would be expected under natural conditions. Compounding the situation, fire suppression has drastically reduced fire-induced regeneration in recent years resulting in few young aged stands.

Noxious Weeds

Noxious weeds, designated by state law and county weed boards, are non-native species that invade areas of native vegetation and replace native species. They are aggressive invaders, especially of disturbed soils, and decrease habitat value for wildlife, reduce range productivity for livestock, and increase costs for other land management activities.

Thirteen species of weeds are known to be well established on about 20,000 acres in the Decision Area (Table 3-7).

A substantial number of these infestations occur adjacent to roads, power lines, streams, ditches, and canals indicating vehicles and water are primary carriers of weed seed. Weed spread also occurs through direct human contact, wildlife use and livestock use. This includes weed seed and plant parts adhering to human clothes and weed seeds and parts adhering to animal hair and passing through their digestive system. Noxious weeds and non-native, invasive species are spreading rapidly in much of the Decision Area, including the Travel Planning Areas for which site-specific plans are proposed in this RMP.

Noxious weed infestations are causing adverse impacts on native plant communities, hydrological cycles, wildlife habitat, soil and watershed resources, recreation, and aesthetic values. A shift from shrub and bunchgrass vegetation to noxious weeds decreases wildlife forage and species diversity and increases soil erosion.

Any habitat type that has been disturbed or is in poor ecological condition is subject to noxious weed invasion. The lack of a forest overstory and the bunchgrass structure of many native grasslands and shrublands render them susceptible to weed invasion and infestation. Spotted knapweed, Dalmatian toadflax, and leafy spurge are the most widespread and frequent weeds.

Noxious weeds in coniferous forest habitat types (mostly the Dry Foothills and Woodlands Zone) are the same species that have invaded grasslands and shrublands. The density and vigor of noxious weed populations are inversely related to shading and competition from overstory trees, seedlings, and saplings. In forests, noxious weeds are usually found in open forest stands that have low tree densities and cover because of moisture limitation, or other disturbance.

Table 3-7						
Acres of Noxious Weeds by 4th Code Watershed in the Decision Area in 2005						
Species	4th Code Watershed¹					
	Big Hole	Blackfoot	Gallatin	Jefferson	Missouri	Yellowstone
Canada thistle	354		5	140	78	5
Dalmatian toadflax	1,490		5	3,805	1,080	4
Diffuse knapweed				11	12	
Dyers woad						
Field bindweed				8		
Houndstongue	485		5	2,230	787	108
Leafy spurge	23		65	954	1,047	99
Oxeye daisy						
Russian knapweed				1	213	
Spotted knapweed	1,192	20	129	1,528	3,370	72
Sulfur cinquefoil				1		
Whitetop				55	16	
Yellow toadflax	108		5	172	81	22
Total	3,652	20	214	8,905	6,684	310

¹ No data indicates the species has not been observed in the unit, not absence of the species from the unit.

Effects of wildland fire and fire-suppression on the spread and introduction of noxious weeds are concerns because forest canopy cover has been lost in many areas that were formerly shaded. Prior to the fires, shading by conifers inhibited noxious weeds from spreading into areas with unburned overstories. The proliferation of noxious weeds may alter post-fire succession.

The Butte Field Office utilizes the Integrated Weed Management approach for noxious weed control in all the resource programs negatively impacted by weeds and works cooperatively with other federal, state, and county entities in the common goal of noxious weed control.

FISH

The PA contains a variety of stream networks ranging from headwater stream systems to major river systems. The PA also contains ponds, lakes, and reservoirs of varying sizes. Fisheries in the PA include high-quality coldwater fisheries in rivers and streams and warm water fish communities in lakes, reservoirs, and larger river systems.

A general overview of conditions and trends of aquatic resources includes the following:

- Currently, native fish species (such as Yellowstone and westslope cutthroat trout, bull trout and Arctic grayling) that were historically common throughout the PA are either uncommon or have been locally extirpated. The loss of native species is mainly due to competition with non-native species, hybridization with non-native species, loss of habitat and over harvest.
- Special-status species (bull trout, fluvial Arctic grayling, westslope cutthroat trout, Yellowstone cutthroat trout, and northern red belly and fine scale dace hybrid) are located throughout portions of the PA and some require special management direction dictated by interagency Memoranda of Understanding and Conservation Plans.
- Water quantity and water quality have been affected by management activities, which can become cumulative and produce environmental changes across the landscape. These activities include fire and fire management, road development, mineral development, livestock grazing practices, vegetation alteration (timber harvest, forage production), alteration of flow regimes (by placement of dams and diversions), and crop production. Other factors such as noxious weeds, wildfire, and drought have also affected water quantity and quality.
- A large portion of riparian areas in the Decision Area are not in proper functioning condition (approximately 56 percent).
- Boundaries of the **Decision Area** have changed and land adjustment (disposal or acquisition) may require different land management activities.

The current condition of aquatic resources is reflective of many types of land use activities that have occurred on state, federal, and private land. The PA contains approximately 7,638 river and stream miles and 60,976 acres of lake/reservoirs in the nine primary 4th field HUCs. Approximately 239 miles of perennial rivers and streams are found within the Decision Area (**Table 3-8**). BLM has lands adjacent to lakes and reservoirs in the PA, but does not specifically manage these water bodies.

Table 3-8
Miles of Streams and Rivers and
Acres of Lakes and Reservoirs

HUC	Miles in the PA	Miles in the DA	Acres in the PA
Blackfoot	181.8	1.9	302
Big Hole	594.3	57.7	923
Boulder	600.6	37.8	558
Gallatin	1,231.1	0.05	1,098
Jefferson	438.8	30.3	1135
Shields	695.6	0.0	651
Upper Missouri	2,089.5	107.7	46,411
Upper Clark Fork	687.9	0.8	7,965
Yellowstone	1,118.3	3.1	1,933
Total	7,637.9	239.35	60,976

Many variables within a watershed can affect or influence the condition of aquatic resources. These variables include but are not limited to: land use practices, ownership, surface, and groundwater quality and quantity, and riparian habitat condition. **Table 3-9** presents conditions of select activities within the nine primary 4th field HUCs across the PA. Appendix J of the AMS generally describes the watersheds within each 4th field HUC.

Habitat and Stream Condition

Stream conditions vary across the PA because of the natural topography and natural and human-caused influences such as logging, mining, grazing, road construction, wildfire, landslides, drought, excessive precipitation, extreme floods, dam construction, and water diversion. These disturbances affect the morphology of streams at excessive rates (in the case of human caused influences) or may occur as more pulse-based influences associated with flooding.

Various components of fish habitat are functioning at risk or non-functional. It should be noted that stream segments on BLM land are typically short (in most cases, less than a mile), making these segments difficult to manage in trying to achieve or maintain proper functioning condition.

In the revised draft Forest Plan, the Beaverhead-Deerlodge National Forest (USDA-FS 2005a) discussed the range of aquatic habitat conditions that occur on

National Forest land. To a similar extent, these conditions also exist within the Decision Area, as often USFS and BLM land adjoin or are in close proximity to one another.

Upstream impacts from public and private land play a significant role in the stream conditions. New laws and land management techniques have reduced impacts across many of the aquatic systems on National Forest land and some improvement has occurred. In stream and riparian areas that have not recovered, poor habitat conditions continue and are exhibited by reduced pool quantity and quality, undesirable width-to-depth ratios, excessive fine sediment, reduced stream channel stability, lack of woody debris, excessive daily and seasonal temperature changes, dewatering and poor water quality (USDA-FS 2005a).

Fish migration and upstream movement are often limited by natural and human influenced fish passage barriers. **Table 3-9** contains information provided by MFWP (2005) regarding the number of fish barriers by watershed across the PA. This data set showed no fish barriers on BLM land with the exception of a man-made barrier on Muskrat Creek to prevent the upstream movement of brook trout into restored westslope cutthroat trout habitat.

Riparian Condition

The BLM's Riparian-Wetland Initiative for the 1990s established national goals and objectives for managing riparian-wetland resources on BLM land (Quigley *et al.* 1999). Riparian/wetland areas achieve proper functioning condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows.

Given the fragmented nature of land in the PA, the BLM-managed stream segments may be in proper func-

tioning condition, however upstream and downstream conditions may be different. Therefore, even though small segments may be in proper functioning condition, they may not have a significant impact on the stream system as a whole. **Table 3-9** contains information regarding the riparian condition of streams within the 4th field HUC within the Decision Area.

Water Quality/Quantity

Water quality and quantity are important for fish populations. Mining, road building, logging, and livestock use have degraded some streams. Irrigation is a major factor influencing water volume of many streams (USDI-BLM 1983). A detailed water quality and quantity discussion regarding 4th field HUCs in the PA is presented in the Water section above.

Fish Species

MFWP manages the native and non-native fish populations in the PA. Records from MFWP (2005) indicate stocking of native and non-native fish began as early as 1923 in the PA. Many different species were stocked with varying frequency and intensity since the stocking program began. Salmonid species that were stocked included westslope and Yellowstone cutthroat trout, rainbow trout and hybrid combinations thereof, brook trout, brown trout, lake trout and bull trout, as well as Chinook and Coho salmon. Arctic grayling were also stocked. Stocking records indicate that fish were stocked in mountain lakes, creeks, streams, small and large rivers (**Table 3-10**).

Endangered, threatened, and sensitive aquatic species are given special consideration if there is concern with population viability, limited distribution, risks to habitat, or other factors that influence management actions in the Decision Area. Five fish species, including bull trout, Yellowstone and westslope cutthroat trout, northern redbelly dace, finescale dace hybrid, and fluvial arctic grayling have special-status in management considerations (**Table 3-10**).

Bull trout occur in the PA in the upper Clark Fork watershed near Anaconda and in the Blackfoot River. There is no BLM-managed land in close proximity to bull trout in the Upper Clark Fork; however, BLM does manage land near the Blackfoot River where bull trout are present.

As **Table 3-10** and **Table 3-10a** indicate, many fish species are found across the PA, providing a diverse fishery and ample recreational opportunities to the public. The presence of salmonids and other special-status fish species is an important aquatic resource component that is used by state and federal officials to evaluate stream health, provide recreational opportunities and can be important in cultural and socioeconomic considerations.

Table 3-10 identifies miles of stream occupied by salmonids and special-status fish species as they relate to the 4th field HUC in the PA and Decision Area, respectively. **AMS Figures 2-21a** through **2-21i** show by 4th field HUC, the surveyed locations of westslope cutthroat and Yellowstone cutthroat trout.

Genetic introgression of native species of salmonids (specifically, westslope and Yellowstone cutthroat trout) with introduced or hatchery fish has been evaluated by the MFWP across portions of the PA. Overall, lands in the Decision Area are more closely related to current and historic westslope cutthroat trout habitats than Yellowstone cutthroat trout habitats. Available information for westslope cutthroat trout is summarized in **Table 3-11** and displayed in **AMS Figures 2-22a, 2-22b, and 2-22c**.

Table 3-9
Current Condition and Trend by 4th Field HUC

Watershed Activity	4 th Field HUC								
	Blackfoot	Big Hole	Boulder	Gallatin	Jefferson	Shields	Upper Missouri	Upper Clark Fork	Upper Yellowstone
BLM Managed Acres Within the PA	932	58,983	40,341	872	40,748	223	147,827	649	8,010
Public Land Acreage	81,394	311,434	306,219	504,161	193,720	86,394	785,132	195,625	550,243
Private Land Acreage	45,355	95,108	179,777	518,934	271,468	428,115	1,109,465	325,325	443,811
Total Acres of Watershed Within the PA	126,749	406,542	485,996	1,023,095	465,188	514,509	1,894,597	520,950	994,054
Primary land use e.g. Grazing, Recreational, Agricultural, Wilderness	Grazing/ Recreation	Grazing/ Recreation	Grazing/ Farming	Farming/ Residential Development	Grazing/ Farming	Grazing/ Farming	Grazing/ Farming	Historic Mining/ Grazing/ Farming	Grazing/ Recreation
Special-Status Species ¹ Presence in PA	BT, WCT	YCT, AG, WCT	YCT, WCT,	YCT, AG, WCT	WCT	YCT	YCT, WCT	YCT, AG, BT, WCT	YCT
Special-Status Species Presence on Decision Area	WCT	YCT, AG, WCT	WCT	None Present	WCT	None Present	WCT	WCT	None Present
Miles of 303d Listed Streams in the PA	42.6	128.3	180.8	186.1	158.4	119.5	337.3	288.9	125.3
Miles of 303d listed Streams on the Decision Area	None	10.7	11.2	None	None	1.9	21.6	None	0.3
Stream Miles of PFC in Decision Area ²	NA	41.1	8.9	NA	14.6	NA	52.5	NA	12.3
Stream Miles Functioning at Risk (FAR) in Decision Area	NA	31.4	16.1	NA	16.7	NA	35.8	0.6	0.8
Stream Miles Nonfunctioning (NFU) in Decision Area	NA	1.5	6.6	NA	4.98	NA	21.2	NA	NA
Surveyed Fish Barriers in the PA ³	1	7	13	16	3	0	65	13	0

¹ Yellowstone cutthroat trout (YCT); westslope cutthroat trout (WCT); bull trout (BT); Arctic grayling (AG).

² Proper Functioning Condition data from Butte Field Office BLM, NA indicates no information was available.

³ From MFWP database.

Table 3-10
Stream Miles of Fish Species of Interest in the PA and Decision Area by 4th Field HUC*

Fish Species	Status ^A	4 th Field HUC																	
		Blackfoot		Big Hole		Boulder		Gallatin		Jefferson		Shields		Upper Missouri		Upper Clark Fork		Upper Yellowstone	
		PA	DA	PA	DA	PA	DA	PA	DA	PA	DA	PA	DA	PA	DA	PA	DA	PA	DA
Yellowstone cutthroat trout	1	NA	NA	17.7	6.0	10.7	NA	100.9	NA	NA	NA	408.5	NA	1.0	NA	8.8	NA	466.7	0.32
Arctic grayling	2	NA	NA	66.8	4.34	NA	NA	80.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bull trout	2	57.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	66.2	NA	NA	NA
Westslope cutthroat trout	1	148.0	2.00	62.0	1.96	36.9	2.96	58.6	NA	22.7	1.33	NA	NA	122.6	3.82	213.0	0.82	NA	NA
Brook trout	NA	91.7	1.94	301.7	17.3	244.2	9.42	378.8	NA	111.3	10.5	165.8	NA	513.2	23.7	183.9	NA	210.6	NA
Brown trout	NA	61.7	1.90	53.8	4.34	71.7	4.70	335.3	NA	99.2	3.24	191.9	NA	430.1	14.01	96.0	NA	247.3	0.72
Rainbow trout	NA	3.9	NA	145.2	12.84	149.3	5.23	425.9	NA	96.9	3.06	68.9	NA	540.9	13.61	55.6	NA	306.1	1.06
Golden trout	NA	NA	NA	NA	NA	NA	NA	6.5	NA	NA	NA	NA	NA	NA	NA	9.0	NA	NA	NA
Yellowstone Cutthroat trout X rainbow trout	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.37	NA

Source: Information was obtained from MFWP databases and is pertinent to the streams they have surveyed. There may be other un-surveyed streams in the PA that also contain similar species.

^A 1= BLM Sensitive; 2 = Federally listed as Threatened

PA = PA; DA = Decision Area

Table 3-10a
Fish Species Occurrence in the Butte Field Office Planning Area

Common Name	Scientific Name	Native or Non-Native	Probable Distribution in the Planning Area	Status
Goldeye	<i>Hiodon alosoides</i>	Native	Yellowstone Drainage	None
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	Native	Yellowstone Drainage	None
Largescale sucker	<i>Catostomus macocheilus</i>	Native	Clark Fork Drainage	None
White sucker	<i>Catostomus commersoni</i>	Native	Missouri River and Yellowstone Drainages	None
Longnose sucker	<i>Catostomus catostomus</i>	Native	Clark Fork Drainage	None
Mountain sucker	<i>Castostomus platyrntnchus</i>	Native	Missouri River Drainage	None
Bigmouth buffalo	<i>Ictiobus cyprinellus</i>	Native	Missouri River Drainage	None
Common carp	<i>Cyprinus carpio</i>	Non-native	Missouri River Drainage	None
Goldfish	<i>Carassius auratus</i>	Non-native	Missouri River Drainage	None
Utah chub	<i>Gila atraria</i>	Non-native	Missouri River Drainage	None
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>	Native	Clark Fork Drainage	None
Redside shiner	<i>Richardsonius balteatus</i>	Native	Clark Fork Drainage	None
Golden shiner	<i>Notemigonus crysoleucas</i>	Non-native	Missouri River Drainage	None
Northern redbelly dace	<i>Phoxinus eos</i>	Native	Missouri River Drainage	None
Northern Redbelly X Finescale Dace	<i>Phoxinus eos x phoxinus neogaeus</i>	Native	Missouri River Drainage	BLM - Sensitive
Longnose dace	<i>Rhinichthys cataractae</i>	Native	Missouri River Drainage	None
Lake chub	<i>Couesius plumbeus</i>	Native	Missouri River and Yellowstone Drainages	None
Flathead chub	<i>Platygobio gracilis</i>	Native	Missouri River Drainage	None
Fathead Minnow	<i>Pimephales promelas</i>	Native	Missouri River Drainage	None
Central mudminnow	<i>Umbra limi</i>	Non-native	Clark Fork Drainage	None
Western mosquitofish	<i>Gambusia affinis</i>	Non-native	PA-Wide	None
Kokanee salmon	<i>Onchornchus nerka</i>	Non-native	Missouri River Drainage	None
Rainbow trout	<i>Oncorhynchus mykiss</i>	Non-native	PA-wide	None
Westslope cutthroat trout	<i>Oncorhynchus clarki lewisi</i>	Native	PA-wide	BLM -Sensitive
Yellowstone cutthroat trout	<i>Oncorhynchus clarki bouvieri</i>	Native to Montana but not all waters on the RA	PA-wide (mountain lakes only)	BLM - Sensitive
Golden trout	<i>Oncorhynchus aquabonita</i>	Non-native	High Elevation Lakes	None

Table 3-10a
Fish Species Occurrence in the Butte Field Office Planning Area

Common Name	Scientific Name	Native or Non-Native	Probable Distribution in the Planning Area	Status
Brown trout	<i>Salmo trutta</i>	Non-native	PA-wide	None
Brook trout	<i>Salvelinus fontinalis</i>	Non-native	PA-wide	None
Bull trout	<i>Salvelinus confluentus</i>	Native	Clark Fork and Black Foot Drainages	USFWS - Threatened
Lake trout	<i>Salvelinus namaycush</i>	Non-native	Missouri River and Clark Fork Drainages	None
Arctic grayling (fluvial)	<i>Thymalus arcticus</i>	Native	Park Lake, Missouri Drainage; Big Hole Drainage; and Heart Lake in the Clark Fork Drainage	BLM - Sensitive
Mountain whitefish	<i>Prosopium williamsoni</i>	Native	PA-wide	None
Channel catfish	<i>Ictalurus punctatus</i>	Native	Missouri River Drainage	None
Stonecat	<i>Noturus flavus</i>	Native	Missouri River Drainage	None
Black bullhead	<i>Ameiurus melas</i>	Non-native	Missouri River Drainage	None
Burbot	<i>Lota lota</i>	Native	Missouri River Drainage	None
Black crappie	<i>Pomoxis nigromaculatus</i>	Non-native	Missouri River Drainage	None
Pumpkinseed	<i>Lepomis gibbosus</i>	Non-native	Missouri River and Clark Fork Drainages	None
Bluegill	<i>Lepomis macrochirus</i>	Non-native	Missouri River Drainage	None
Smallmouth bass	<i>Micropterus dolomieu</i>	Non-native	Missouri River Drainage	None
Largemouth bass	<i>Micropterus salmoides</i>	Non-native	Missouri River Drainage	None
Slimy sculpin	<i>Cottus cognatus</i>	Native	Clark Fork Drainage	None
Mottled Sculpin	<i>Cottus bairdi</i>	Native	Missouri River Drainage	None
Yellow perch	<i>Perca flavescens</i>	Non-native	Missouri River and Clark Fork Drainages	None
Walleye	<i>Sitzaostedion vitreum</i>	Non-native	Missouri River Drainage	None

¹Planning Area-wide includes: portions of the Madison, Jefferson, Gallatin, Boulder, Clark Fork, Blackfoot, Big Hole, Missouri River and Yellowstone Rivers.

Source: Montana Department of Fish Wildlife and Parks, 2005.

Table 3-11
Westslope Cutthroat Trout Introgression Within the Planning and Decision Areas

Watershed	Status ¹	Stream Miles	
		PA	Decision Area
Big Hole	1	31.22	1.43
	2	11.84	
	5	2.88	
	6	3.65	
Blackfoot	1	103.45	0.05
	2	10.93	
	5	22.04	
	6	15.99	1.90
Jefferson	1	6.4	
	5	8.17	
	6	6.61	0.14
Boulder	1	28.85	2.96
	2	3.45	
	5	1.61	
Gallatin	1	4.18	
	2	9.22	
	3	23.16	
	6	17.94	
Upper Missouri	1	44.40	0.49
	2	20.06	0.05
	3	6.60	0.47
	4	15.23	0.84
	5	9.83	0.04
	6	30.65	2.08
Upper Clark Fork	1	52.56	
	2	15.83	
	5	36.26	0.83
	6	108.3	

¹Status: 1 = Unaltered; 2 = < 10% Introgression;
3 = 10 – 25% Introgression 4 = > 25% Introgression
5 = Suspected Unaltered; 6 = Potentially Altered

Restoration

MFWP, BLM, and the USFS collaborate in an ongoing effort to conserve westslope cutthroat trout in Muskrat Creek, a tributary to the Boulder River. The relatively high quality aquatic and riparian conditions as well as the remnant westslope cutthroat trout population provide an excellent opportunity for westslope cutthroat trout restoration in this stream. A wooden barrier was constructed near the USFS boundary at river mile 7.6 in 1997. Since that time, brook trout have been annually removed (using electrofishing) upstream of the barrier to a natural barrier at river mile nine, above which the brook trout do not occur.

In 1997, native westslope cutthroat trout were also re-located above the natural barrier (formerly a fishless section of stream). The westslope cutthroat trout re-located above the natural barrier survived and reproduced in the upper basin and by 2002 the trout had expanded upstream to the headwaters (approximately river mile 13.5) as well as downstream throughout the stream. Removal of brook trout between the man-made barrier and natural barrier has been successful. In the summer of 2003, only 18 brook trout were found in July and no

brook trout were captured during an extensive effort of four electrofishing passes in October. All the brook trout captured during July 2003 were age 2 and older fish confirming that no brook trout were successfully re-cruited to the population during the past three years. No brook trout were captured during 2004 or 2005 and approximately 5.9 miles of Muskrat Creek is once again considered to have a restored and protected population of westslope cutthroat trout. MFWP now uses this stream as a donor source of fish to re-establish westslope cutthroat trout populations in other streams within and beyond the PA boundaries.

WILDLIFE

Important wildlife habitats include wetlands and riparian areas, coniferous forests, shrublands, grasslands, snags (standing dead trees), cliffs and rocky outcrops, and caves and abandoned mines. Seasonally important habitats include big game winter ranges, calving and fawning areas, raptor nest sites, bat breeding and hibernation sites, waterfowl nesting areas, sage grouse and sharptail grouse courtship (leks) and nesting areas, wolf denning and rendezvous sites, and grizzly bear habitat. The PA is

an important wildlife linkage area that connects the Yellowstone Ecosystem, the Continental Divide, the Gravelly Mountains, the Tobacco Root Mountains, the Belt Mountains, and the Northern Continental Divide Ecosystem allowing the potential for movement and genetic exchange among geographically dispersed wildlife populations. The extents of the various habitats are shown in **Table 3-4**.

Populations and distribution of wildlife in the PA have been influenced by past management activities that have altered habitat or caused disturbance including agricultural activities (including livestock grazing), mining, timber management, exclusion of fire (colonization by conifers into grasslands and shrublands), recreation, urban and suburban expansion, highway and road construction.

While the BLM manages habitat for a variety of wildlife species, it is the MFWP that has responsibility to manage wildlife populations.

Habitats

Grassland/Shrubland

Sagebrush grasslands are critical areas for a variety of wildlife species as they provide critical winter range for game species and there are many species that are sagebrush obligates.

Grassland and shrubland communities have been identified to be dominant communities within the winter ranges of antelope, elk, mule deer, moose, and bighorn sheep within the PA. Sagebrush is one of the only shrubs that have levels of crude protein high enough to sustain large herbivores throughout the winter. Other shrublands that occur within the PA include low sagebrush, bitterbrush, and mountain mahogany.

Both grassland and shrublands provide habitat for a variety of wildlife species by providing forage, cover, and water. Species that utilize these habitats include: mule deer, elk, pronghorn antelope, coyote, red fox, badger, jackrabbit, pygmy rabbit, black-tailed prairie dog, sage grouse, ferruginous hawk, Swainson's hawk, mountain plover, sage thrasher, sage sparrow, Brewer's sparrow, long-billed curlew, northern harrier, prairie falcon, Baird's sparrow, chestnut-collared long spur, loggerhead shrike, marbled godwit, McCown's longspur, Sprague's pipit, western rattlesnake, and Columbian, Wyoming, and Richardson's ground squirrels.

There are a variety of factors that reduce the quality and availability of grassland and shrubland communities in the PA. Fire suppression has probably had the greatest influence within these communities, as changes in fire regimes have resulted in encroachment of conifers into grassland and shrubland communities; thereby reducing the grassland/shrubland habitat (Heyerdahl et al. 2006). The introduction of noxious weeds has also resulted in a loss in grassland habitats in some areas. In addition, grazing can degrade and influence grassland/shrubland

habitats when stocking rates are at levels that cause a decline in rangeland health.

Dry Foothills / Woodlands

Open savannah-like communities of Douglas-fir and ponderosa pine adapted to dry conditions occupy sites at upper elevations of grasslands and shrublands. These communities are important to wildlife species such as flammulated owls, which utilize large snags for nesting habitat. Large ponderosa pine and Douglas-fir snags occur in low densities but persist on the landscape for long periods and provide a critical habitat component. While conifer encroachment into grasslands and shrublands is resulting in a loss of these habitats, areas of conifer encroachment provide habitat for a wide variety of birds, small mammals, and big game animals. Woodlands have been identified as important communities within winter range for elk, moose, mule deer, bighorn sheep, and white-tailed deer. Mountain mahogany communities can be particularly important in some areas by providing winter range for big game animals. These areas can also be critical for providing transitional habitat between winter and summer range and travel corridors for wildlife.

Some of the species that can be found in these communities include: mule deer, white tailed deer, big horn sheep, elk, and moose and coyote, bobcat, mountain lion, black bear, yellow-pine chipmunk, red squirrel, striped skunk, sharp-shinned hawk, Cooper's hawk, blue grouse, hairy and downy woodpeckers, chickadees, mourning dove, finches, evening grosbeak, jays, Clark's nutcracker, nuthatches, spotted towhee, dark-eyed junco, mountain bluebird, Williamson's sapsucker, northern flicker, common nighthawk, olive-sided flycatcher, dusky flycatcher, golden-crowned kinglet, Swainson's thrush, hermit thrush, Townsend's solitaire, solitary vireo, western tanager, Cassin's finch, pine siskin, western small-footed myotis, long-eared myotis, silver-haired bat and hoary bat.

Cool, Moist Conifer Zone

Cool, moist coniferous forest stands within the PA provide habitat for a variety of wildlife species. Some of these species include: elk, moose, deer, black bear, grizzly bear, lynx, mountain lion, wolverine, fisher, marten, goshawk, cooper's hawk, sharp-shinned hawk, boreal owl, three-toed woodpecker, black-backed woodpecker, hairy woodpecker, Williamson's sapsucker, northern flicker, and hermit thrush. This community can also be very important for providing winter range for big game species such as elk, moose, and white-tailed deer.

Snags and down wood are major wildlife habitat components of the ecosystem. Their natural abundance and distribution have been altered by decades of land conversion, fire suppression, timber and firewood harvest, and mining activities. Standing snags provide foraging, roosting, denning, and nesting habitat for a number of wildlife. A variety of cavity nesters and forest mammals

rely on the presence of large diameter snags for reproduction and protection. In addition, there are several sensitive species that are dependent on old growth habitat and the downed woody material that is found within these stands. Maintaining a diversity size and age classes is very beneficial for forest wildlife species.

As snags decay and fall to the ground, they become down wood and provide food and shelter for different species. Down wood also stores nutrients and moisture, and aids in soil development.

Subalpine Fir

Snags occur in pulses of high density subalpine fir, spruce, lodgepole pine, and occasionally Douglas-fir, that historically persisted for short periods of time (5-25 years). Snags can occur over extensive areas (10's to 1,000's) of acres. Large, unfragmented patches of burned or insect killed stands are critical for species that depend on this type of habitat such as black-backed and three-toed woodpeckers, and the Canada lynx that requires large areas of young subalpine and lodgepole pine forest for foraging.

The wildlife species that utilize these habitats are many of the same species that are found in the cool, moist conifer habitat. Some of these species include: elk, deer, moose, lynx, wolverine, grizzly bear, black bear, pine marten, boreal owl, blue grouse, Clark's nutcracker, and a variety of migratory birds. These communities are not as susceptible to the impacts of fire suppression and timber management.

Wetland/Riparian

Riparian areas are important because they generally have better quality soils than the surrounding hillslopes and, because of their position lower in the landscape, often retain moisture over a longer period. Riparian areas support a higher diversity of plants and animals than non-riparian land. This is a result of the wider range of habitats and food types present as well as the proximity to water, microclimate, and refuge. Many native plants are found only, or primarily, in riparian areas, and these areas are essential to many animals for all or part of their lifecycle. Riparian land also provides a refuge for native plants and animals in times of stress, such as drought or fire, and plays a large role in providing corridors for wildlife movement.

Although riparian zones may occupy a relatively narrow band, they are critical to maintaining the biodiversity of the more extensive, adjoining uplands. For example, over 75 percent of the animal species in arid regions need riparian habitats at some stage of their life cycles. A variety of wildlife species utilize wetland/riparian habitats. Some of these species include: white-tailed deer, moose, bobcat, beaver, otter, mink, coyote, and a variety of small mammals such as skunks, shrews, mice, weasels, and voles as well as numerous bat species. Lynx are known to use riparian areas as dispersal corri-

dors and for hunting snowshoe hare. Wetland/riparian habitats support the highest densities and diversity of breeding birds such as: bald eagle, Swainson's hawk, red-tailed hawk, owls, great blue heron, flycatchers, woodpeckers, belted kingfisher, spotted sandpiper, western wood-peewee, white-crowned sparrow, yellow warbler, song sparrow, other warblers, and a variety of migratory birds.

Rivers, streams, ponds, and wetlands provide important habitat for migrating waterfowl such as redheads, pintails, goldeneye, bufflehead, Canada geese, and snow geese. These habitats also provide habitat for breeding waterfowl including common merganser, wood duck, ruddy duck, lesser scaup, cinnamon teal, blue-winged teal, green-winged teal, northern shoveler, American widgeon and gadwall. Although habitat for waterfowl is found throughout the Planning Area, these habitat types are limited in the Decision Area.

Aspen

Aspen stands are relatively rare in Montana when compared to the other Rocky Mountain States, but where they occur they support a diverse avifauna. It is often the only broadleafed tree within coniferous forests and therefore provides unique foraging substrates for a variety of insectivorous birds. Its suckers, twigs, and bark are used by wintering ungulates, particularly deer, elk, and moose. Snowshoe hare and cottontail rabbit feed on its twigs and buds, while ruffed grouse are highly dependent on aspen buds in winter. Aspen also provides cavities and snags for cavity dependant wildlife.

Producing profuse suckering from aspen regeneration practices does not ensure the reestablishment of new aspen stands. Suckers are highly palatable to some wildlife, such as elk and moose, and entire stands of young aspen can be lost to browsing. In addition, young aspen are quite fragile and susceptible to physical damage caused by trampling from hooved animals, including livestock. For these reasons, efforts to reestablish aspen in small localized areas often fail. Isolated pockets of young aspen tend to draw elk, moose, and deer to these areas resulting in unacceptable levels of browsing. Similarly, efforts to reestablish aspen in areas of heavy livestock use often result in excessive damage to young trees.

Insect and Disease

Dwarf mistletoe provides a source of vertical and horizontal diversity through gap creation, and production of snags, brooms and down woody material. Many species of mammals, birds, and arthropods can take advantage of the favorable structure mistletoe infection provides, while other species use mistletoe plants or host tissues associated with infection for food.

The abundance of dwarf mistletoe is directly correlated with species diversity and bird density (Bennetts 1991). There is also a strong positive relationship between the occurrence of dwarf mistletoe in an area and the number

of snags used by cavity-nesting birds (Bennetts 1991). Witches' brooms are commonly used for nest sites, roosting sites, and cover by a number of bird species. The large mistletoe brooms on Douglas-fir are often used as nesting platforms by several owls, accipiters (including the cooper's hawk, goshawk, and sharp-shinned hawk) and passerines. Brooms are also used for roosting cover by grouse. The plant itself is also a food source for some birds (notably Douglas-fir dwarf mistletoe for blue grouse), mule deer, elk, squirrels, chipmunks, and porcupine.

Wildlife Corridors

Wildlife travel corridors are a vital component of habitat for a variety of species. Corridors are travel routes used by wildlife to allow them to disperse to new core areas. Corridors allow for seasonal movements between summer and winter ranges for species such as elk and deer. Corridors are also important for movement of young animals dispersing from their place of birth to establish new territories and home ranges. This can be critical for territorial species such as mountain lion or grizzly bear. A corridor may also be used for daily movements from loafing to foraging areas.

Habitat fragmentation and isolation of populations as a result of degradation or elimination of corridors can result in small, vulnerable populations. Isolated populations are more vulnerable to stochastic events and can be negatively impacted by inbreeding depression. The primary causes for habitat fragmentation are activities related to development such as road building, recreational activities, and residential and commercial developments. Fragmentation of habitat is a concern within the PA as 49 percent of the PA is privately owned and has the potential to be developed. However, 85 percent of Decision Area lands are contiguous with other public lands (**AMS Figure 2-14**). The majority of this land is contiguous with National Forest System land and 75 percent of the blocks of BLM land that are contiguous with other public lands are larger than 1,280 acres. These larger areas that are connected to other public lands provide an opportunity for management of wildlife corridors and core habitat.

Factors that are considered in evaluating corridors include: topography, habitat quality, road density, riparian presence, human developments and activities, vegetative cover and land ownership patterns. It is important to identify wildlife corridors and manage to protect and maintain food, cover, and security and minimize mortality factors.

The Interagency Grizzly Bear Committee (IGBC) identified approaches to managing wildlife linkage areas on public land (IGBC 2004). Some of their recommendations for management include:

- Maintain appropriate amounts and distribution of natural foods and hiding cover in linkage zones to

meet the subsistence and movement needs of target wildlife species.

- Avoid constructing new recreation facilities or expanding existing facilities within linkage zones.
- Avoid other (non-recreational) new site development or expansions that are not compatible with subsistence and movement needs of target species in linkage zones.
- Pursue mitigating, moving, and/or reclaiming developments and disturbed sites that conflict with the objective of providing wildlife linkage.
- Manage dispersed recreational use to maintain suitability of approach areas for identified target species. Avoid issuing new permits or additional use days for recreational activities that may conflict with wildlife linkage objectives.
- Manage roads and trails in linkage zones to facilitate target species movement and limit mortality risk, displacement, and disturbance.
- Manage livestock grazing to maintain wildlife forage and hiding cover and to minimize disturbance, displacement, and mortality of target wildlife species.
- Work with adjacent landowners, planners, and other interested parties to improve linkage opportunities across multiple jurisdictions.
- Manage human, pet and livestock foods, garbage, and other potential wildlife attractants to minimize the risk of conflicts between people and wildlife.

Considerable research has been conducted on wildlife corridors within the Northern Rocky Mountain Region. Walker and Craighead (1997) identified potential corridors within Montana using GIS and 'umbrella' species. The 'umbrella' species they selected included grizzly bear, elk and mountain lion. They identified corridors that had the highest likelihood of successful transfer between the Greater Yellowstone Ecosystem and the Northern Continental Divide Ecosystem and many of these corridors occur within the PA. The corridors identified for grizzly bear occur in the Gallatin, Bridger, and Big Belt mountain ranges. Secondary corridors occur in the Taylor-Hilgard, Gravelly, Tobacco Root, White-tail/O'Neil, and Boulder mountain ranges. Corridors for elk were identified to occur in the north end of the Absaroka, Bridger, and Big Belt ranges, while corridors for mountain lions occur in the Bridger and Big Belt mountains.

Craighead *et al.* (2002) modeled wildlife corridors within the Northern Rocky Mountain Region, delineated core and sub-core habitat areas, and described corridors based on their habitat quality. The model relies on a series of assumptions. One of the critical assumptions is that migrating animals would select the least-cost path or optimum path for travel and that these paths would be

Table 3-12
Corridor Quality in the Planning and Decision Areas

Corridor Quality	Acres of Corridors in PA		Acres of Corridors in DA	
	Acres	% of PA	Acres	% of Decision Area
Core/Sub-core Areas	3,400,418	47	70,019	23
Highest Quality Corridors	223,139	3	22,533	7
Moderate Quality Corridors	534,990	8	61,971	20
Lowest Quality Corridors	838,933	12	45,564	15

those areas in which the animal would encounter fewer hazards, spend less time traveling, and travel through habitat with a higher probability of containing food and concealment, thus increasing the chance for survival. Corridors were developed based on the habitat needs of grizzly bear. Core areas were described as areas large enough for wildlife to forage and reproduce, while sub-core areas were areas that could act as stepping stones for wildlife as they move through the region. Corridors were described as areas of predicted movement between core and sub-core areas, where habitat quality is high, but not as high and contiguous as the core and sub-core areas. Based on this model, 70 percent of the PA is core, sub-core or corridor habitat, with 65 percent of the Decision Area in core, sub-core or corridor habitat. **Table 3-12** and **AMS Figure 2-15** display the acreages for core areas and corridors within the PA and BLM land within the PA.

Within the PA, almost half of the land represents core or sub-core habitat. Of the corridor habitat within the PA, the majority of the corridors are either moderate or low quality. The high quality corridors are located west of Anaconda along the Anaconda Mountains and along Elk Park Pass between Butte and Boulder.

Big Game Animals

Nine species of big game animals occur within the PA. These species are elk, mule deer, white-tailed deer, moose, pronghorn antelope, bighorn sheep, mountain goat, mountain lion, and black bear. Much of the information presented below was based on reports developed by the MFWP. The PA falls entirely within Region 3 of the MFWP regional structure.

Habitat improvement projects occur on both private and public land within the PA. Prescribed burning, riparian restoration, thinning, reduction of conifer encroachment in grasslands and meadows, noxious weed control, riparian restoration, water development, and improved livestock grazing management are all management practices that have been implemented and improve big game habitat. The BLM also coordinates with private landowners, the USFS, and other management agencies to develop and implement habitat improvement projects.

Elk

Elk are generalists exhibiting a wide habitat tolerance. They are distributed throughout the PA and western

Montana, but are most commonly associated with mountain ranges (Foresman 2001; MFWP 2003; Skovlin 1983). They utilize the majority of vegetation types found within the PA and are adapted to habitat in transitional areas as there is a negative correlation between levels of use and the distance from the interface between forest and nonforest communities (Skovlin 1983). This relationship is assumed to be due to elk dependence on security cover and the diversity of forage available in transitional areas.

Elk are both grazers and browsers. Their forage preferences vary among seasons and years, and are strongly related to forage availability (Nelson and Legee 1983). Elk migrate seasonally between winter and summer ranges with snow accumulation being the significant factor influencing migration. Wintering grounds are commonly located within foothill areas with south-southwest exposures and windblown ridges. Grassland and shrublands are typically used as winter range. Available winter range is commonly the limiting factor for elk populations; therefore, proper management of identified winter range is important for maintaining stable elk populations.

Approximately 30 percent (2,084,670 acres) of the PA is designated elk winter range, with approximately 188,000 acres of that being managed by the BLM (**AMS Figure 2-16**) (MFWP 1999a). Elk winter range within the PA occurs in predominately woodland and grassland/shrub communities. The PA also contains mapped calving and migration areas; however, the BLM manages only a small portion of this land.

Within the PA, there are approximately 10 Elk Management Units (EMU) as designated by the MFWP (MFWP 2004b). Elk populations within the majority of the EMU's have been either stable or increasing over the last 20 years. This is thought to primarily be a result of changes in hunting regulations from season-long, either sex seasons to antlered bull regulations and limited antlerless permits (MFWP 2004b). Additional factors influencing elk populations within the PA include the recent mild winters, which have resulted in less winter kill, reduced harvesting, and changes in land ownership. Within certain EMUs, land ownership has shifted from traditional landowners that allowed public access for hunting to non-traditional landowners that restrict hunting on their private property, thereby creating refuges for big game. The shift in land ownership and management

has been significant within some EMU's and has impacted harvest success and survey accuracy.

Livestock grazing, timber management and recreation are the most predominant uses of lands within the Decision Area and all of these activities can impact elk habitat. Approximately 80 percent of the Decision Area is managed for livestock grazing. Elk and cattle do have dietary overlap and can compete for forage, which can become critical on winter range. Cattle and elk do not typically utilize the same areas during the winter season as livestock are usually concentrated on private land. However, livestock grazing management has a significant impact on elk winter range as it influences the amount of residual forage that is available for elk.

The Decision Area provides recreational opportunities for the public as this area receives some of the highest levels of hunting on public land and the highest level of bull elk harvest (MFWP 2004b). Recreational activities, especially high levels of OHV use, can degrade elk habitat and cause disturbance to elk. Snowmobile recreation areas, when located within elk winter range, can deter elk from using those disturbed areas and can result in displacement. Roads can also have a significant impact on the quality of elk habitat. Winter range in the Decision Area is broken into 11 areas (**Table 3-13**) for analysis of big game winter range. Within each analysis area, the moving windows analysis was used to calculate open road density within winter range.

Within the Decision Area, the analysis areas with the lowest road densities (less than 1 mile per square mile) in elk winter range are the Big Hole (56 percent), Elkhorns (53 percent), Highlands (56 percent), Missouri (83 percent), Upper Missouri (64 percent), and Yellowstone (7 percent). The Missouri analysis area provides a large amount of elk winter range on BLM lands and also provides the highest quality habitat. Analysis areas with the highest road densities (greater than 2 miles per square

mile) in elk winter range are the Blackfoot (72 percent), Clancy (66 percent), and Granite Butte (67 percent).

Timber management is a common resource use in elk summer range within the PA. Timber harvest can have both positive and negative impacts on elk habitat. Timber harvest can improve elk habitat in many areas as it improves the cover to forage ratio. Ideally, cover to forage ratio should not fall below 60:40. The disturbance associated with the implementation of timber harvest can result in the temporary displacement of elk. In addition, the loss of security habitat and an increase in road density can have a negative effect on elk. Elk security measures are the inherent protection allowing elk to remain in an area despite increases in stress or disturbance associated with hunting season or other human activities. Security habitat areas are forested habitats with trees larger than 8 inches DBH, greater than 30 percent density and larger than 250 acres, nonlinear, at least 0.5 mile from an open road, and occupying at least 30 percent of the area used during autumn. **Table 3-14** shows the total acres of security habitat by watershed in the Planning and Decision Areas.

Table 3-14 Acres of Elk Security Habitat by Watershed		
Watershed	Total Security Habitat Acres	BLM Security Habitat Acres
Big Hole	63,016	5,808
Blackfoot	19,468	0
Gallatin	30,401	301
Jefferson	72,722	2,965
Upper Clark Fork	48,251	0
Upper Missouri	205,000	9,395
Upper Yellowstone	557,823	405

Table 3-13 Total Road Density for the Decision Area in BLM Elk Winter Range by Big Game Analysis Area								
Elk Winter Range Analysis Unit	Total Acres	Total Winter Range	Winter Range on BLM	BLM Acres				
				0 mi/mi²	Low Density 0-1 mi/mi²	Moderate Density 1- 2 mi/mi²	High Density 2 -3 mi/mi²	Very High Density >3 mi/mi²
Big Belts	290,949	138,825	6,688	650	1,545	2,207	1,280	1,006
Big Hole	336,143	130,712	23,015	5,257	7,701	4,503	2,330	3,224
Blackfoot	127,398	55,705	445	0	49	76	50	270
Clancy	150,854	110,911	10,879	375	1,173	2,159	2,220	4,952
Elkhorns	641,976	140,437	28,080	4,149	10,816	8,515	3,033	1,567
Granite Butte	192,583	141,729	17,699	158	1,775	3,886	5,121	6,759
Highlands	84,049	57,933	26,407	6,125	8,746	6,204	3,630	1,702
Jefferson	834,418	208,531	33,378	5,706	7,353	7,002	6,003	7,314
Missouri	223,957	140,820	24,031	17,102	2,853	1,409	1,573	1,094
Upper Missouri	327,784	120,992	6,481	2,551	1,565	1,437	822	106
Yellowstone	731,613	159,748	3,252	1,583	787	660	222	0

Mule Deer

Mule deer are distributed throughout Montana and are found in open forested regions, plains, and prairies. They commonly inhabit foothill, coulee, or riparian areas within a grassland or shrubland habitat type. Mule deer can also be found in alpine, subalpine, montane, and foothill zones (Foresman 2001; Mackie *et al.* 1998). In seasonally harsh environments, like western and central Montana, mule deer tend to migrate between seasonal ranges (Mackie *et al.* 1998). Winter range is associated with areas accumulating minimal amounts of snow and tends to occur at low elevation, south and west facing slopes, and wind-blown ridges. Winter range is particularly important for maintaining healthy mule deer populations because the lack of high quality forage, cold temperatures, and increased energy demand associated with the winter season tends to limit and stress populations.

Mule deer will tend to browse year-round favoring species such as bitterbrush, mountain mahogany, sagebrush, and deciduous shrubs. Forbs and herbaceous plants become an important part of their diet in late spring and summer, while shrubs are critical in the fall and winter.

Mule deer are distributed throughout the PA. Approximately 95 percent of the PA represents mule deer habitat. Thirty-four percent (2,445,000 acres) of the PA is year-round/winter range for mule deer with 206,800 acres (8 percent) of that being located on BLM land (AMS **Figure 2-17**) (MFWP 1999a). The majority of the mule deer year-round/winter range within the PA occurs in grassland/shrubland and woodland communities.

The last MFWP published report discussing the status of mule deer in Region 3 was completed in 2002 (MFWP 2002d). This report stated that the mule deer populations within Region 3 were relatively stable and static from 1996 to 2001. The report also stated that recruitment was improving within populations and it was expected that populations would tend to be on the increase.

White-Tailed Deer

White-tailed deer occur throughout Montana and are adapted to a variety of habitats (Foresman 2001). They are common along river bottoms and adjacent uplands in the PA. Habitat disturbance resulting from agriculture and logging have been beneficial to white-tailed deer and has facilitated range expansion (Smith 1991).

White-tailed deer make extensive use of riparian habitat and hardwood forests. Riparian cover appears to influence abundance of white-tailed deer and they are more commonly associated with agriculture than mule deer (Mackie *et al.* 1998). White-tailed deer prefer grasses and forbs during spring and early summer, and then switch to new-growth leaves and twigs of small trees and shrubs. Browse is very important for white-tailed deer year-round. In agricultural areas, cultivated crops are important dietary components (Mackie *et al.* 1998).

Approximately 20 percent (61,328 acres) of the Decision Area is identified as general white-tailed deer habitat (MFWP 1999a). The common vegetation communities within this habitat include riparian forests and habitats and woodlands.

Moose

Moose are closely associated with densely forested and riparian habitats and depend upon woody vegetation, preferably in early successional stages that occur following disturbances (Foresman 2001; Franzmann 1981). They tend to use mountain meadows, river valleys, wetlands, and clear cut areas in the summer and utilize willow flats and mature coniferous forests in the winter. They prefer feeding on forbs and aquatic or woody vegetation depending on the season. Moose are adapted to deep snow and extreme cold temperatures and have difficulties coping with warmer temperatures (above 20 °C) (Foresman 2001).

Moose are distributed widely throughout the PA where suitable habitat is present. Within the PA, there are 2,398,598 acres of general moose habitat, which is approximately 33 percent of the PA. Of the general moose habitat in the PA, the BLM manages six percent (18,559 acres) (MFWP 1999a). An estimated 13 percent of the PA is moose general/winter habitat. A significant portion of the moose habitat in the Decision Area is found within the Big Hole and Boulder river basins. In addition, Mount Haggin Wildlife Management Area (56,151 acres) occurs within the PA and has a management goal of providing year-round habitat for moose.

The last completed Progress Report on moose done by the MFWP was in 2001 (MFWP 2001a). The trend information presented in this report was based on harvest and hunter day trends and indicated that moose populations within Region 3 had some fluctuations between 1996 and 2001, but were relatively stable.

Pronghorn

Pronghorn are found within open sagebrush or grassland areas within the PA. Sagebrush grasslands are the preferred winter habitat as browse is a critical food source during this period. Maintenance of healthy range condition is important for pronghorn management as forbs are important during the spring fawning period. The highest annual mortalities are generally related to spring blizzards. Pronghorn tend to avoid areas with vegetation higher than 38 cm as it interferes with their visibility and detection of predators (Yoakum 1978).

Approximately 16 percent (1,143,677 acres) of the PA represents pronghorn habitat with the BLM managing 72,559 acres of that habitat (MFWP 1999a). The majority of this habitat is located in the Boulder River basin and the Elkhorn Mountains. The last MFWP published report discussing the condition of pronghorns within Region 3 was completed in 2002. This report stated that during the period of 1996 to 2001, antelope populations

within the region were stable and the trends generally remained unchanged (MFWP 2002c). Approximately 90 percent of the pronghorn overall distribution and winter range within the PA occurs in the grassland/shrubland zone.

Pronghorn can be in conflict with livestock grazing, especially range fences. Fences can inhibit the movement of pronghorn because they have a tendency to crawl under the fences rather than jump over them. This can become a serious issue in the winter, especially severe winters, as fences can bisect major winter migration routes and, as snow levels become deep, the pronghorn are unable to crawl underneath the fences. Sheep, mesh or field fence can also prevent the movement of pronghorn because these woven wire types of fence do not allow pronghorn to crawl beneath. To allow for pronghorn to pass under fences, wire fences should be designed with 3 wires placed at 16-inch, 26-inch, and 36-inch heights.

Bighorn Sheep

Bighorn sheep have a limited distribution within the PA and typically use areas with cliffs, mountain slopes, or rolling foothills. Winter habitat generally occurs on open slopes or ridges where grass is available. Grass and shrubs are common food sources during the winter while grass, sedges, and forbs are heavily used in the spring and summer. Winter range is the limiting factor for bighorn sheep herds; therefore, identification and management of winter range is important for management of healthy bighorn populations.

Bighorn sheep tend to forage in open areas with low vegetation such as grasslands, shrublands, or mixes of these and avoid foraging on slopes with shrub or canopy cover in excess of 25 percent and shrubs 2 feet (60 cm) or higher. Proximity to escape cover and open aspects with good visibility are important features of quality bighorn sheep habitat, particularly for females with young. Bighorn sheep prefer open habitats which facilitate predator detection and enhance visual communication of alarm postures.

Approximately 712,000 acres within the PA are bighorn sheep habitat. Winter range is approximately 187,000 acres of that with the BLM managing 54,000 acres (29 percent) (AMS Figure 2-18) (MFWP 1999a). The majority of the winter range mapped within the PA occurs in the Upper Missouri area, the Elkhorn Mountains and the Big Hole River Basin. The dominant vegetation communities in this habitat are grassland/shrubland and woodland communities.

Bighorn Sheep have been re-introduced into three areas in the PA; Sleeping Giant Wilderness Study Area, Soap Gulch (Camp Creek) and Shep's Ridge (Indian Creek/Crow Creek). The last published report done by MFWP discussing the condition of bighorn sheep within Region 3 was completed in 2002. The Sleeping Giant population was declining prior to 1999 due to poor nutri-

tion (MFWP 2002b). The population seemed to be increasing until 2001 at which time a die-off within the population was documented. Approximately 50 sheep were relocated to Soap Gulch/Camp Creek between 2000 and 2001. The Camp Creek population experienced a die-off between 1994 and 1995 due to a pneumonia complex. Six years after the die-off, the recruitment was minimal, although the animals appeared to be healthy. The Shep's Ridge population was healthy and expected to continue growth, as of 2002 (MFWP 2002b).

Bighorn sheep are highly susceptible to some strains of *Pasteurella* carried by domestic sheep. Bighorn sheep usually die after exposure to specific strains of *Pasteurella* from healthy domestic sheep.

Mountain Goats

Mountain goats utilize areas with steep, broken terrain and can sometimes utilize subalpine forests. They typically utilize distinct summer and winter ranges with snow accumulation strongly influencing selection of winter range. Mountain goats utilize south facing slopes, canyon walls and windblown ridges in the winter, and meadows, ravines, cliffs, and sometimes forests in the summer. Common food sources include grass, sedges, lichens, and shrubs. Mountain goats are fairly sensitive to disturbance and overharvest.

Mountain goats have been transplanted in various locations within the PA. Within the MFWP Region 3, four of the populations are native, and the rest either are transplants or are the result of dispersing transplant populations. The last Mountain Goat Progress Report completed by the MFWP (MFWP 2001b) indicated that the majority of the populations within Region 3 were either stable or increasing.

Limited mountain goat range occurs within the PA and populations have been steadily declining over the last decade. Due to low population numbers, accurate census data is limited. Within the PA, there are approximately 705,000 acres of mountain goat habitat mapped with the BLM managing about 19,000 acres (3 percent) (MFWP 1999a). The majority of this habitat occurs in the Upper Missouri area. There are four known individual mountain goats utilizing BLM land within the Sleeping Giant Wilderness Study Area. The population has been decreasing since the early 1990's when the population contained 50 individuals. The vicinity of the Sleeping Giant Wilderness Study Area provides approximately 15,000 acres of mountain goat habitat.

Black Bear

Black bears use a variety of habitats depending on seasonal variation in diet and availability of food. Black bears are omnivorous; however, a significant portion of their diet consists of berries, fruits, grasses, sedges and inner bark. The entire PA is black bear habitat; however,

they tend to prefer dense forested areas, riparian areas, open slopes, and mountain meadows (Foresman 2001).

The most recent Black Bear Progress Report compiled by the MFWP Region 3 was completed in 2002 (MFWP 2002e). These reports were based on the harvest data received from 1996 to 2001. The harvest trends during these years indicated that bear populations in Region 3 were declining; however, the significance of this decline was not discussed. The report also identified that the majority of black bear harvesting within Region 3 occurred in the eastern portion of the region.

Black bears tend to be relatively tolerant of land uses as they have a large home range and can utilize a variety of habitats. Recreation, road development, and timber management are land uses that tend to have the greatest impacts to black bear habitat. Road development within the PA is at a moderate level of 1.8 miles per square mile (mi/mi²) and has not been identified as negatively impacting black bear habitat. Timber harvest can cause temporary disturbance and displacement of black bears; however, small timber cuts can improve black bear habitat by increasing the vegetation diversity.

Mountain Lion

Mountain lions are distributed throughout the PA where suitable habitat is present. They use a variety of vegetation types, depending on prey availability, cover, and preference for areas with minimal human disturbance. Mountain lions typically prefer mountainous and foothill areas; however, in eastern Montana, they are commonly associated with riparian areas and woody draws. Mountain lions are carnivorous and feed on a variety of animals. However, they prefer deer, elk, porcupine, and rabbit.

Gamebirds

The PA provides habitat for a variety of upland gamebirds and waterfowl. Blue grouse and spruce grouse occupy the coniferous forests, while ruffed grouse, sharp-tailed grouse, and Merriam's turkey are found in dryer coniferous forests, brushy draws, riparian areas, or grassland areas with a strong presence of shrubs. Sage grouse are a sagebrush obligate species and are discussed further under the sensitive species section. Ring-necked pheasant, chukar, and gray partridge are also found in the grasslands and croplands within the PA. Ducks and geese also utilize the PA for nesting and brood rearing.

The last published Progress Report on upland gamebirds within Region 3 compiled by the MFWP was completed in 1996 (MFWP 1996). This report discussed harvest levels as an indicator of population. A general trend of decline within the late 1980s followed by an increase in the 1990s was observed with all the gamebird species with the exception of the grouse. Ruffed, spruce, blue, and especially sage grouse all experienced a decline throughout 1987 to 1996. There was little data available

for snipe, chukar, and mourning dove as little harvest for these birds occurred during the period covered.

SPECIAL STATUS SPECIES

Special-status species are those species listed as threatened or endangered under the Endangered Species Act (ESA), species proposed or candidates for listing, and species designated as "sensitive" by BLM.

Fish

Bull Trout (Listed Threatened)

In the PA, critical habitat includes portions of the Clark Fork River. Historically, bull trout were well distributed throughout the upper Clark Fork but are now rare or non-existent in the main stem Clark Fork River between the Blackfoot River and Warm Springs Creek (MBTSG 1995). Bull trout do reside however, in the Blackfoot River. Some sections of Warm Springs Creek contain bull trout but they are primarily resident populations residing in the headwaters and Barker Lake, Storm Lake, Twin Lakes, Cable Creek, and Foster Creek.

According to the "Upper Clark Fork River Drainage Bull Trout Status Report", Warm Springs Creek is a core area and nodal habitat for bull trout (MBTSG 1995). Core areas are drainages that currently contain the strongest remaining populations of bull trout. They are usually relatively undisturbed and need to have the most stringent levels of protection as they can potentially provide stock for re-colonization. Nodal habitat includes waters containing migratory corridors, over-wintering areas and other critical habitat.

Westslope Cutthroat Trout (BLM Sensitive)

The westslope cutthroat trout is a sub-species of cutthroat trout native to Montana. Its natural range is on both sides of the Continental Divide; excluding the Yellowstone River drainage.

In the PA, westslope cutthroat trout are found in the Blackfoot, Clark Fork, Upper Missouri, Madison, Jefferson, Gallatin, Boulder, and the Big Hole rivers as well as many of their tributaries. **AMS Figures 2-21a through 2-21i** depict current habitat in the PA known to support westslope cutthroat trout. Some of the streams in the PA that support westslope cutthroat trout are small and have very low late summer flows. Small young of the year and yearling westslope cutthroat trout can be found in streams less than 18 inches in width.

There are four primary reasons for the decline of this species. First, habitat has been lost due to poor grazing practices, historic logging practices, mining, agriculture, residential development, and the lingering impact of forest roads. Fish have been unable to use spawning habitat due to dewatering of streams for irrigation and because of barriers created by dams and road culverts.

Second, non-native species (brook trout, lake trout, brown trout, and northern pike) out-compete juvenile cutthroat trout for food or prey on cutthroat trout. Barriers that disrupted historical migration routes for westslope cutthroat trout have sometimes served to protect them from non-native species.

A third reason for decline is hybridization with other species. Westslope cutthroat trout hybridize with rainbow trout and other non-native cutthroat trout subspecies. Many remnant genetically pure cutthroat trout populations, on both sides of the Continental Divide, are located above barriers that protect them from non-native species.

The fourth cause of decline has been overfishing. Westslope cutthroat trout are highly susceptible to angling (Behnke 1992) but it is uncertain how much of an impact this has had on the species' overall decline.

Montana has developed a Conservation Agreement (MFWP 1999b). This agreement prioritizes protecting genetically pure populations first, then slightly introgressed populations.

Yellowstone Cutthroat Trout (BLM Sensitive)

The historical distribution of Yellowstone cutthroat trout is believed to have included much of the Yellowstone River basin, including portions of the Clark Fork of the Yellowstone River, Bighorn River, and Tongue River basins in Montana and Wyoming, and parts of the Snake River basin in Wyoming, Idaho, Utah, and Nevada (Behnke 1992). In recent times, the majority of the indigenous populations in Montana inhabit headwater streams, although the Yellowstone River main stem also supports large numbers of indigenous Yellowstone cutthroat trout. Due to the stocking of Yellowstone cutthroat trout, the distribution of this fish in lakes has actually increased, as it is now believed that over 100 lakes in Montana support pure Yellowstone cutthroat trout, some of which are found in the PA.

Nonnative fish may be the greatest threat to the persistence of Yellowstone cutthroat trout. Because Yellowstone cutthroat trout and rainbow trout readily hybridize and produce fertile offspring, hybrid populations often become established. Introductions or invasions of brown trout and brook trout have led to displacement of cutthroat trout throughout the western U.S.

The widespread stocking of nonindigenous populations of Yellowstone cutthroat trout often leads to genetically homogeneous populations and may be detrimental to their long-term persistence.

The influence of other nonnative organisms also threatens the persistence of Yellowstone cutthroat trout. Yellowstone cutthroat trout are probably susceptible to infection by whirling disease. The effects of New Zealand mud snail on trout populations and aquatic ecosystems are unknown but also could be detrimental. This snail is presently found in the Madison, Snake, and Yel-

lowstone rivers and is likely to be inadvertently introduced (probably by anglers) into additional waters.

Habitat degradation is thought to favor certain nonnative fishes and can directly affect Yellowstone cutthroats. Because many populations of Yellowstone cutthroat trout possess complex life histories relying on movement among diverse habitats, disruptions in habitat quality or availability may lead to extinction of isolated populations.

Historically, intensive harvest by anglers altered the size structure and abundance of Yellowstone cutthroat trout in some waters. However, harvest restrictions appear to protect Yellowstone cutthroat trout under severe angling pressure.

Arctic Grayling (BLM Sensitive)

The Arctic grayling is a native species to Montana and the only remaining indigenous fluvial population in Montana is found in the Big Hole River. Currently, Arctic grayling are found in the Big Hole River, in the Madison River near Ennis, or in small, clear, cool lakes with tributaries suitable for spawning. In the PA, Arctic grayling are found in the Big Hole River and Park Lake within the Missouri River drainage and Heart Lake within the Clark Fork Drainage.

The fluvial Arctic grayling was formally classified as a Candidate species in 1991. A petition to upgrade the status of the fluvial Arctic grayling to Endangered was submitted in October 1991. A recent finding on the petition recommended that listing was not warranted since the population does not constitute a distinct population segment as defined by the ESA.

Although fluvial Arctic grayling inhabit the entire Big Hole River, highest densities occur in the vicinity of Wisdom. The majority of spawning occurs near Wisdom in the main stem and several tributaries. Fluvial Arctic grayling rear in the vicinity of where they hatch; thus, the Wisdom area provides the majority of rearing habitat. Moderate densities of Arctic grayling reside between the mouth of the North Fork Big Hole River and Dickie Bridge. Limited spawning occurs in lower reaches of several tributaries within this reach. Rainbow trout and brown trout increase in abundance below Dickie Bridge, where Arctic grayling are found in low densities.

Factors potentially threatening survival of Arctic grayling in the Big Hole River include water quality and quantity, competition with introduced species, predation, habitat degradation, and angling. Water quantity issues include drought and recruitment limitation due to sudden runoff events. Sudden increases in stream flows during hatching and emergence of larval Arctic grayling may decrease survival and limit recruitment in the Big Hole River. Extreme flood flows may also severely impact Arctic grayling recruitment in the Big Hole River.

Extreme low flows during severe drought decrease survival of older Arctic grayling due to high water tempera-

tures, increased susceptibility to predation, and diminished habitat volume. Diversion of water for agriculture has exacerbated persistent drought conditions. All salmonid species in the upper Big Hole River have declined in abundance during the present drought.

The distribution of Arctic grayling in the Big Hole basin suggests that they are being displaced by non-native brown and rainbow trout through competition. Predation on juvenile Arctic grayling by all non-native species is also a source of mortality.

Historically, angling may have impacted fluvial Arctic grayling populations in Montana because they are easily caught by anglers and susceptible to over-harvest; however, catch-and-release-only regulations enacted in 1988 in the Big Hole River appear to adequately protect the Arctic grayling population from over-exploitation.

Another factor potentially limiting grayling in the Big Hole River is habitat degradation. Degradation of riparian vegetation and stream banks by cattle grazing, mass willow removal, and dewatering the river for agricultural uses have negatively impacted fish habitat. High levels of fine sediments, high mid-summer water temperatures, and loss of suitable habitat volume have impacted Arctic grayling in the Big Hole River.

Northern Redbelly Dace Hybrid (BLM Sensitive)

The northern redbelly dace x finescale dace hybrid (*Phoxinus eos* x *P. neogaeus*) is a Montana species of special concern, Class C. It was placed on the species of concern list due to its rarity and unusual form of genetic reproduction. Northern redbelly dace prefer quiet waters such as beaver ponds, bogs, and clear streams. The finescale dace likes similar habitat but is also found in larger lakes. These dace spawn in the spring and early summer.

Further inventory is needed to better define dace distribution in Montana. Due to difficulties of field differentiation, it is likely that some waters thought to contain only northern redbelly dace may also have the hybrid.

Wildlife

Following is a discussion of the current habitat and status of those species identified in **Table 3-15** to have the potential to occur within the PA.

Grizzly Bear (Listed Threatened, Northern Continental Divide Ecosystem Recovery Zone)

Portions of two grizzly bear recovery zones overlap the PA. The very southeastern tip of the Northern Continental Divide Ecosystem Recovery Zone overlaps the northwest corner of the PA. The Yellowstone Ecosystem Recovery Zone overlaps the southern portion of the PA, north and east of Yellowstone National Park. Occupied habitat extends north of the Yellowstone Recovery zone to near Interstate-90, between Livingston and Bozeman (AMS Figure 2-19).

Within the Northern Continental Divide Ecosystem Recovery Zone, 17,100 acres occur within the PA; however, the BLM does not manage any of this land. Of the area that has been identified and delineated as occupied grizzly bear habitat within the Northern Continental Divide Ecosystem, 232,240 acres occur in the PA with approximately 8,000 acres (3 percent) of that being under BLM management. Within the Yellowstone Ecosystem Recovery Zone, 994,670 acres occurs within the PA; however, the BLM does not manage any of this land. Of the occupied grizzly bear habitat within the Yellowstone Ecosystem Recovery Zone, 1,881,415 acres occur in the PA with approximately 5,775 acres (less than one percent) of that being under BLM management.

The road density within the PA portion of the Yellowstone Ecosystem is low at an average of 1.0 mi/mi² of roads. The road density within the Northern Continental Divide Ecosystem is considerably higher with an average of 2.6 mi/mi². This level is higher than the average road density for the entire PA which is 1.8 mi/mi².

Grizzly bear corridors with the highest likelihood of successful transfer between the Greater Yellowstone and Northern Continental Divide Ecosystems occur in the Gallatin, Bridger, and Big Belt mountain ranges. Secondary corridors occur in the Taylor-Hilgard, Gravelly, Tobacco Root, White-tail/O'Neil, and Boulder mountain ranges (Walker and Craighead 1997).

Similarly, modeling predicted that 70 percent of the PA is core, sub-core, or corridor habitat, with 65 percent of the Decision Area in core, sub-core, or corridor habitat (Craighead *et al.* 2002).

Canada Lynx (Listed Threatened)

Canada lynx are classified as a furbearer in Montana but the trapping season is currently closed. In Montana, lynx are found in mountain and forest regions. East of the Continental Divide the subalpine forests inhabited by lynx occur at higher elevations (1,650 to 2,400 meters) and are composed mostly of subalpine fir. Secondary habitat is intermixed Englemann spruce and Douglas-fir habitat types where lodgepole pine is a major seral species (Ruediger *et al.* 2000). Throughout their range, shrub-steppe habitats may provide important linkage habitat between the primary habitat types described above (Ruediger *et al.* 2000).

Approximately 30 percent of the PA is lynx habitat (cool, moist conifer zone and subalpine fir zone). Approximately eight percent (21,738 acres) of the Decision Area is cool, moist conifer zone, while one percent (1,796 acres) is subalpine fir zone. Based on lynx habitat and linkage zone mapping (USDA-FS and USDI-BLM 2004), approximately 212 square miles of lynx linkage areas occur within the PA.

**Table 3-15
Special Status Wildlife Species in the PA**

Common	Scientific Name	Status	Found In PA?	Habitat
Threatened and Endangered Species				
Canada lynx	<i>Felis lynx</i>	Threatened	Yes	Wet forest habitats, with large woody debris, and suitable habitat for primary prey (snowshoe hare) present (usually above 4000 feet elevation).
Grizzly bear (Northern Continental Divide Population)	<i>Ursus arctos horribilus</i>	Threatened	Yes	Remote forest habitats with low road density and minimal human disturbance.
Black-footed ferret	<i>Mustela nigripes</i>	Endangered	No	Prairie habitats with large prairie dog colonies, marginal habitat present in PA.
Whooping crane	<i>Grus americana</i>	Threatened	No	Wetlands and meadows that provide food and resting habitat for migrating cranes. Migratory habitat present in PA.
Piping plover	<i>Charadrius melodus</i>	Threatened	No	Wetlands, lakes, and ponds having shorelines and beaches with sparse vegetation. Habitat not present in PA.
Sensitive Bird Species				
Baird's sparrow	<i>Ammodramus bairdii</i>	Sensitive	No	Prairie grasslands of northern and eastern Montana, PA outside range of occurrence.
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive (De-listed)	Yes	Nesting and perching trees near water with primary prey species (fish and water-fowl) present.
Black-backed woodpecker	<i>Picoides arcticus</i>	Sensitive	Yes	Foraging and nesting habitats in conifer forests that have insect infestations associated with fire and disease.
Black tern	<i>Chilidonias niger</i>	Sensitive	No	Colonial nester in marshes. Habitat present in PA.
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	Sensitive	No	Breeding habitat in Montana is restricted to open stands of Utah juniper and limber pine with intermixed big sage. PA outside range of occurrence.
Brewer's sparrow	<i>Spizella breweri</i>	Sensitive	Yes	Short-grass prairie with scattered or abundant sagebrush, or other arid shrub habitats.
Burrowing owl	<i>Athene cunicularia</i>	Sensitive	Yes	Prairie grasslands and shrublands often in prairie dog or ground squirrel burrows.
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	Sensitive	Yes (not in DA)	Native mixed-grass prairie.
Common loon	<i>Gavia immer</i>	Sensitive	Yes (migration)	Floating nest in lakes in or near emergent wetland vegetation. Migrant on lakes and reservoirs. Pres
Dickcissel	<i>Spiza americana</i>	Sensitive	No	Open meadows and grasslands in eastern Montana. PA outside range of occurrence.

**Table 3-15
Special Status Wildlife Species in the PA**

Common	Scientific Name	Status	Found In PA?	Habitat
Ferruginous hawk	<i>Buteo regalis</i>	Sensitive	Yes	Grassland and shrublands in rolling foothills and middle elevation plateaus.
Flammulated owl	<i>Otus flammeolus</i>	Sensitive	Yes	Nests primarily in mature and old-growth ponderosa pine and Douglas-fir forests.
Franklin's gull	<i>Larus pipixcan</i>	Sensitive	Yes (migration)	Breeds on large relatively permanent prairie marsh complexes.
Golden eagle	<i>Aquila chrysaetos</i>	Sensitive	Yes	Prefers open habitats and nests on cliffs or large trees.
Great grey owl	<i>Strix nebulosa</i>	Sensitive	Yes	Nests in snags, cavities, and stick nests in mature conifer forest, often near meadows and forest openings.
Greater sage grouse	<i>Centrocercus urophasianus</i>	Sensitive	Yes	Obligately linked to sagebrush habitat for nesting and wintering. Historically, this species is present, but not documented breeding since 1992. Habitat is present.
Harlequin duck	<i>Histrionicus histrionicus</i>	Sensitive	No	Nests along large, fast-flowing mountain streams. Habitat Present in PA.
LeConte's sparrow	<i>Ammodramus leconteii</i>	Sensitive	No	Prefer wet meadows dominated by sedges or grasses. PA outside range of occurrence.
Loggerhead shrike	<i>Lanius ludovicianus</i>	Sensitive	Yes	Open shrub and grassland habitats.
Long-billed curlew	<i>Numenius americanus</i>	Sensitive	Yes	Nests and forages in prairie grasslands and shrublands.
Marbled godwit	<i>Limosa fedoa</i>	Sensitive	No	Breeds primarily in the Prairie Pothole Region with short-grass to mixed-grass prairie. PA outside range of occurrence, however, migratory habitat is present.
McCown's longspur	<i>Calcarius mccownii</i>	Sensitive	Yes (not in DA)	Characteristic of shortgrass prairie.
Mountain plover	<i>Charadrius montanus</i>	Sensitive	Yes	Arid shortgrass prairie, often in association with prairie dog colonies.
Nelson's Sharp-tailed sparrow	<i>Ammodramus nelsoni</i>	Sensitive	No	Nests in grassland, marsh edges, and herbaceous wetlands. PA outside range of occurrence.
Northern goshawk	<i>Accipiter gentilis</i>	Sensitive	Yes	Nests in mature to old-growth conifer and aspen forest
Peregrine falcon	<i>Falco peregrinus anatum</i>	Sensitive	Yes	Nests on ledges and cliffs, often near water with prevalent prey base (birds).
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	Sensitive	No	Open country, open groves of large trees or groups of scattered trees in fields, and old burns. Cavity nester. PA outside range of occurrence.

**Table 3-15
Special Status Wildlife Species in the PA**

Common	Scientific Name	Status	Found In PA?	Habitat
Sage sparrow	<i>Amphispiza belli</i>	Sensitive	No	Nests in sagebrush/grassland habitats. Habitat present in PA.
Sage thrasher	<i>Oreoscoptes montanus</i>	Sensitive	Yes	Limited almost entirely to semi-dry regions and communities containing extensive sagebrush.
Sedge wren	<i>Cistothorus platensis</i>	Sensitive	No	Breeding habitat is wet meadows and marsh edges. PA outside range of occurrence.
Sprague's pipit	<i>Anthus spragueii</i>	Sensitive	Yes (not in DA)	Prefers native, medium to intermediate height prairie.
Swainson's hawk	<i>Buteo swainsoni</i>	Sensitive	Yes	Nests in trees, often in riparian areas.
Three-toed woodpecker	<i>Picoides tridactylus</i>	Sensitive	Yes	Breeds and forages in conifer forests with high incidence of insect infestation from fire, disease, or wind throw.
Trumpeter swan	<i>Cygnus buccinator</i>	Sensitive	Yes (not in DA)	Nests in emergent vegetation at edge of lakes and ponds.
White-faced ibis	<i>Plegadis chihi</i>	Sensitive	No	Large marshes and wetlands with emergent vegetation. Habitat present in PA.
Willet	<i>Cataptrophorus semipalmatus</i>	Sensitive	Yes	Shallow wetlands in the northern Great Plains, nests mainly in native prairie and grasslands.
Wilson's phalarope	<i>Phalaropus tricolor</i>	Sensitive	Yes (not in DA)	Breeds around shallow, marshy wetlands on the plains.
Yellow rail	<i>Coturnicops noveboracensis</i>	Sensitive	No	Breeding habitat consists of wet sedge meadows and other wetlands. PA outside range of occurrence.
Sensitive Mammal Species				
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	Sensitive	Yes	Associated with grasslands and shrub/grassland in relatively level sites.
Fisher	<i>Martes pennanti</i>	Sensitive	Yes (not in DA)	Mature conifer communities, often associated with riparian areas in boreal forests.
Fringed myotis	<i>Myotis thysanodes</i>	Sensitive	Yes	Variety of habitats from low to mid-elevation grass, woodland, and desert regions, up to and including spruce-fir forests.
Fringe-tailed myotis	<i>Myotis thysanodes pahasapensis</i>	Sensitive	No	Prefers dry, coniferous forests, ponderosa pine, and juniper. PA outside range of occurrence.

**Table 3-15
Special Status Wildlife Species in the PA**

Common	Scientific Name	Status	Found In PA?	Habitat
Gray Wolf	<i>Canis lupus</i>	Sensitive (de-listed in March 2008)	Yes	Forest and shrubland habitats with adequate prey base of big game animals present.
Great Basin pocket mouse	<i>Perognathus parvus</i>	Sensitive	No	Desert and semi-desert habitats dominated by sagebrush and grassland communities. Marginal habitat present in PA.
Grizzly Bear (Yellowstone Population)	<i>Ursus arctos horribilus</i>	Sensitive (De-listed)	Yes	Remote forest habitats with low road density and minimal human disturbance.
Long-eared myotis	<i>Myotis evotis</i>	Sensitive	Yes	Often associated with forested stands containing old-growth characteristics, but found in habitats characterized by shrubland and juniper.
Long-legged myotis	<i>Myotis volans</i>	Sensitive	Yes	Primarily montane coniferous forest and riparian habitat.
Northern bog lemming	<i>Synaptomys borealis</i>	Sensitive	Yes (not in DA)	Open fens and forested wetlands with dense cover of mosses and sedges. Habitat present in PA.
Pallid bat	<i>Antrozous pallidus</i>	Sensitive	No	Associated with dry, desert environments, but range into oak and pine forests. PA outside range of occurrence.
Northern myotis	<i>Myotis septentrionalis</i>	Sensitive	Potentially	Mixed and coniferous forests. Hibernacula often occur in abandoned mines and narrow crevices.
Pygmy rabbit	<i>Brachylagus idahoensis</i>	Sensitive	Yes	Can be found in a variety of sagebrush structures, but have found to show a preference for dense stands of big sagebrush, often along drainages with alluvial soil deposition.
Spotted bat	<i>Euderma maculatum</i>	Sensitive	No	Roosts in arid habitats with cliffs and crevices and forages over meadows, wetlands, and water bodies. Habitat not present in PA.
Swift fox	<i>Vulpes velox</i>	Sensitive	No	Prairie habitats with high density of small mammals (ground squirrels or prairie dogs), its primary prey. PA outside range of occurrence.
Townsend's big-eared bat	<i>Plecotis townsendii</i>	Sensitive	Yes	Roosts and hibernates in caves and mines and forages over open areas with wetlands and riparian communities.
Western spotted skunk	<i>Spirogale gracilis</i>	Sensitive	Yes	Woody, brushy habitat often in riparian areas.
Wolverine	<i>Gulo gulo luscus</i>	Sensitive	Yes	Forages in remote areas of boreal forests and dens in high-elevation cirques.
White-tailed prairie dog	<i>Cynomys leucurus</i>	Sensitive	No	Grassland and sagebrush habitat of southeastern Montana. PA outside range of occurrence.

**Table 3-15
Special Status Wildlife Species in the PA**

Common	Scientific Name	Status	Found In PA?	Habitat
Reptiles and Amphibians				
Snapping turtle	<i>Chelydra serpentina</i>	Sensitive	No	Large rivers in eastern Montana. PA outside range of occurrence.
Spiny softshell turtle	<i>Trionyx spiniferus</i>	Sensitive	No	Large rivers in eastern Montana. PA outside range of occurrence.
Boreal/Western toad	<i>Bufo boreas</i>	Sensitive	Yes	Uses a variety of habitats including low elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes, to high elevation ponds, fens, and tarns at or near tree line.
Coeur d'Alene salamander	<i>Plethodon idahoensis</i>	Sensitive	No	Wet areas near waterfalls, with dense moss cover in extreme western Montana. PA outside range of occurrence.
Great Plains toad	<i>Bufo cognatus</i>	Sensitive	No	In Montana they seem to prefer the higher elevations of short-grass prairies or undifferentiated grasslands, meadows within open stands of ponderosa pine, and areas near streams and irrigated lands. PA outside range of occurrence.
Greater short-horned lizard	<i>Phrynosoma hernandesi</i>	Sensitive	Yes	Ridge crests between coulees, and in sparse, short grass and sagebrush with sun-baked soil. Current status is unknown.
Northern leopard frog	<i>Rana pipiens</i>	Sensitive	No	Wetlands and water bodies. Historically present but none documented recently.
Plains spadefoot	<i>Spea bombifrons</i>	Sensitive	Yes	Found in arid grasslands and sagebrush with sandy or loose soils; usually near permanent or temporary water bodies.
Milk snake	<i>Lampropeltis triangulum</i>	Sensitive	Unknown	Sandstone bluffs, rock outcrops, grasslands, open ponderosa pine and juniper stands. Habitat is present.
Western Hog-nosed snake	<i>Heterodon nasicus</i>	Sensitive	No	Arid areas, prairie grasslands and shrublands, floodplains with gravelly or sandy soils. PA outside range of occurrence.

Sources: Foresman 2001; MTNHP 2004; MPIF 2000; Maxell et al 2003; Reichel and Flath 1995, MBDD 2005; Lenard et al. 2003.

Gray Wolf (De-listed/BLM Sensitive)

The gray wolf was de-listed from the Endangered Species Act in March, 2008. Before de-listing, the majority of the PA was within the Greater Yellowstone Recovery and Central Idaho Areas; populations in these areas were redesignated as nonessential experimental. A relatively small northwestern portion of the PA was in the Northwest Montana Recovery Area where wolves had endangered status. As reported in the 2004 Annual Report (USFWS *et al.* 2005), there are an estimated 835 wolves within the Northern Rocky Mountain Recovery Areas and 153 of those occur in Montana.

There essentially was no increase in the wolf population numbers in 2004 within the Greater Yellowstone Recovery Area and it is believed that the wolf population in this area has stabilized (USFWS *et al.* 2005).

Bald Eagle (De-listed/BLM Sensitive)

MFWP has been conducting bald eagle nest surveys since the early 1990's. Bald eagles have been documented throughout the PA. Breeding eagles can be found on the Missouri, Jefferson, and Yellowstone rivers. Resident bald eagle populations occur in the Upper Missouri River area at Hauser Lake and monitoring of these populations has occurred since the 1970's (Restani and Harmata 1997).

There are currently approximately 50 nest sites documented within the PA, although, not all of them are active annually. The mean brood size and nesting success has been steadily increasing for bald eagles within Montana. Bald eagle concentrations at Hauser Lake have been found to be strongly correlated to the presence of salmon (MBEWG 1994). From 1991 to 1996, 100 to 300 migrating eagles were identified to congregate at Hauser Lake. These numbers have declined due to a decline in kokanee salmon within the lake. By 2000, fewer than 20 bald eagles were documented utilizing the area. MFWP have been stocking the salmon at Hauser Lake in an attempt to restore the fishery, but have not been successful. The entire PA is potential winter habitat for bald eagles, although the larger rivers with fisheries are used more commonly.

Golden Eagle (BLM Sensitive)

In Montana, golden eagles eat primarily jackrabbits, ground squirrels, and carrion. They occasionally prey on deer and antelope fawns, small mammals, waterfowl, and grouse. Golden eagles nest on cliffs, in large trees, or occasionally on artificial structures such as power poles.

Approximately 60 percent of the PA is representative golden eagle habitat (grass and shrubland, woodland or agriculture). In 1996, surveys were conducted within the PA to determine population status and reproductive success (Markum and Harmata 1996). Within the 20,000 square kilometers (km²) that was surveyed, 84 breeding areas were located containing 142 nests. Only 29 percent

of the potential breeding areas were occupied and only six young were produced. These surveys were repeated in 1997 (Markum and Harmata 1997), and although they found that the number of pairs available for breeding, actual breeding attempts, and the overall number of young produced increased, the differences between years were not significant and were suspected to be due to proper survey timing and the use of aerial surveys.

The 1997 surveys documented 28 active breeding areas and 16 young produced.

Burrowing Owl (BLM Sensitive)

Burrowing owls are widely distributed east of the Continental Divide in Montana. They are typically associated with open grasslands and commonly use abandoned burrows of mammals for nest sites. Burrowing owls are opportunistic feeders and their diet varies with the seasons. Their historic range expands into the PA; however, there is no recent documentation of burrowing owls within the PA. The reduction in prairie dog populations is believed to be contributing to the decline of these owls.

Brewer's Sparrow (BLM Sensitive)

Brewer's sparrows are sagebrush obligate species that prefer sites with high shrub cover and large patch size (Ashley and Stoval 2004). Their open cup shaped nests are typically found in live big sagebrush. These sparrows occur within the PA and breeding habitat has been documented (Lenard *et al.* 2003).

Sage Grouse (BLM Sensitive)

Sage grouse are sagebrush obligate species that prefer sagebrush stands with a canopy cover of at least 20 percent and a height of 8 inches or higher. Research conducted in Montana found that breeding habitat usually occurs in sagebrush habitat with 20 to 50 percent sagebrush canopy cover (MSHWG 2005). Lekks are typically located in areas of bare ground or low-density vegetation such as ridge tops. Nesting typically occurs within two miles of the lek and has a sagebrush canopy cover between 15 to 30 percent. Sage grouse populations in Montana are at low levels and are declining. State-wide, population numbers for sage grouse were relatively stable until 1984, while sage grouse declined from 1991 through 1996 and increased through 2000 (MSGWG 2005). Approximately nine percent (2,354,572 acres) of the statewide sage grouse habitat occurs within Region 3 and there are 36 known active lekks in this region.

Historically, general sage grouse habitat comprised 1,620,000 acres within the PA, which has been reduced to approximately 340,000 acres. Within the PA, there are approximately 67,000 acres of sage grouse breeding/nesting habitat. These areas occur within the Big Hole River basin and the Yellowstone area. The BLM manages approximately 1,250 acres (2 percent) of the breeding/nesting habitat and 21,700 acres (6 percent) of

the general habitat (AMS **Figure 2-20**). MFWP monitors several leks in the PA; however, no sage grouse leks have been documented on BLM land in the PA since 1992.

Sage Thrasher (BLM Sensitive)

Sage thrashers are sagebrush obligate as they are common inhabitants of shrub-steppe communities that are dominated by big sagebrush. Nest-site selection is specific as most nests are located within or beneath sagebrush plants with high foliage and branch density (MPIF 2000). Dense patches of large sagebrush plants and low densities of exotic plants also seem to be an important habitat characteristic for sage thrashers. Documented breeding habitat occurs within the PA (Lenard *et al.* 2003).

Chestnut-collared Longspur (BLM Sensitive)

The Montana distribution for chestnut-collared longspurs is east of the Continental Divide on native mixed-grass and tall and short grass prairies. Chestnut-collared longspurs arrive on Montana breeding ground in late April and first clutches are initiated in early to mid-June (MPIF 2000). Flocking occurs as nesting ends in mid-August and migration begins in early September. Historic range occurs in the PA; however, there is no recent documentation of these birds using the PA (MBDD 2005; Lenard *et al.* 2003).

Loggerhead Shrike (BLM Sensitive)

Loggerhead shrikes breed throughout much of eastern Montana in a variety of habitats such as grassland prairies with scattered trees, riparian areas, woody draws, or cultivated land with shelterbelts. In Montana grasslands and shrub steppe, loggerhead shrikes tend to select areas with a significant presence of shrubs and forbs (Dechant *et al.* 1998). Loggerhead shrikes have been documented utilizing the PA (MBDD 2005; Lenard *et al.* 2003).

Long-billed Curlew (BLM Sensitive)

The long-billed curlew breeds throughout Montana and typically nests in the high plains, preferring well-drained native grasslands, sagebrush, and agricultural land with gentle rolling topography (MPIF 2000). Long-billed curlews are found throughout the PA (MBDD 2005; Lenard *et al.* 2003).

McCown's Longspur (BLM Sensitive)

Montana provides a large portion of the available breeding habitat for McCown's longspurs. They can be found throughout Montana, east of the Continental Divide. Historic habitat occurred within the PA; however, there have been no recent documentations of McCown's longspur using the PA (Lenard *et al.* 2003).

Mountain Plover (BLM Sensitive)

Research indicates that mountain plovers were historically widely distributed through the PA. Some early

naturalist reports suggest that they were not common, but always associated with short grass prairies (Knowles and Knowles 1998). Mountain plover surveys were conducted within some areas of the PA during 1991 to 1996 (Knowles and Knowles 1997). Plovers were generally associated with *Stipa comata* and *Bouteloua gracilis* habitat types. They were closely associated with slopes under five percent, vegetative heights under six cm, and greater than half the soil surface being bare ground or lichen. Reproduction was documented and approximately 150 mountain plovers were observed.

Sprague's Pipit (BLM Sensitive)

Research suggests that large areas of grassland are preferred by Sprague's pipit and, in some areas, a minimum area of 190 hectares is required (MPIF 2000). The historic range for Sprague's pipit occurred in the southeastern portion of the PA; however, there has been no recent documentation of these birds and only a small portion represents habitat (MBDD 2005; Lenard *et al.* 2003).

Black-backed Woodpeckers (BLM Sensitive)

In Montana, black-backed woodpeckers are most abundant in recent stand-replacing burns (Hill *et al.* 2002). Black-backs are most common in the northwest portion of the state; however, they have been documented in the Big and Little Belt Mountains and the Bridger Range. Surveys documented black-backed and three-toed woodpeckers nesting and successfully breeding in the Nursery Creek area in 2003. Nursery Creek (west side of Elkhorn Mountain Range) had a stand replacing fire in 2000 and was not salvage logged. Surveys for black-backs or three-toes were conducted in a salvage cut in the Boulder area in 2003 and neither was found.

Three-toed Woodpeckers (BLM Sensitive)

Three-toed woodpeckers are mainly found in northwest Montana; however, they have been documented within the PA (MBDD 2005; Lenard *et al.* 2003).

Trumpeter Swan (BLM Sensitive)

The trumpeter swans that breed within Montana are members of the Rocky Mountain population. Breeding trumpeter swans are not common in Montana but nest along the Rocky Mountain front where habitat is present. Wintering birds are mainly found in southwestern Montana. There is the potential for trumpeter swans to occur within the PA as breeding has been documented (MBDD 2005; Lenard *et al.* 2003).

Willet (BLM Sensitive)

Most of the documented occurrences of willets in Montana have occurred east of the Continental Divide in prairie wetlands. Willets prefer a mosaic of wetland types with adjacent grasslands for nesting and brood rearing. There is the potential for willets to occur within

the PA as breeding has been documented within the area (MBDD 2005; Lenard *et al.* 2003).

Black-tailed Prairie Dog (BLM Sensitive)

Historically, there was an estimated 1.5 million acres of black-tailed prairie dog occupied habitat in Montana. This has been reduced to an estimated 100,000 acres (Knowles 2005). Several prairie dog towns have been documented in the southern Elkhorn Mountains and in the Whitehall Valley (Knowles 2005).

There is only one documented prairie dog town within the Decision Area. The town is located at Holter Lake and is approximately 13 acres (402 mounds). BLM has issued a yearlong closure on the discharge of all weapons within the area of this town.

Fisher (BLM Sensitive)

Thought to be extirpated in Montana, fishers were reintroduced into western and northwestern Montana (Foresman 2001). Recently, verified fisher records have been documented in various mountain ranges of western and south-central Montana (Vinkey 2003), including the Beartooth Range. While there are no recent records of fisher in the PA (MTNHP 2004), potential habitat occurs in both the Planning and Decision Areas.

Northern Bog Lemming (BLM Sensitive)

Northern bog lemming habitat does occur within the PA and within the Decision Area. Although they have not been documented on BLM land, there is the potential for them to occur there.

Spotted Skunk (BLM Sensitive)

There are limited documented occurrences of spotted skunks in Montana and they have occurred in the southwestern and south central portion of the state. There is the potential for spotted skunks to occur within the PA and within the Decision Area.

Pygmy Rabbit (BLM Sensitive)

Although pygmy rabbits have typically been associated with relatively tall, dense stands of basin big sage or Wyoming big sage, surveys completed by the BLM have found that pygmy rabbits also utilize stands of mountain, three-tip and low sage (Bockting 2005). Surveys also documented that pygmy rabbits will use stands of low, relatively open sagebrush. Montana is at the northeastern edge of the pygmy rabbits range. There has been documented burrow activity within the PA in the Big Hole River basin as recent as fall of 2004.

Wolverine (BLM Sensitive)

Wolverines occur in coniferous forests within the PA (Foresman 2001; Inman 2004). Wolverines are associated with alpine tundra and coniferous mountain forests of western Montana, especially in large wilderness areas. In Montana, Hornocker and Hash (1981) found most wolverine use in medium to scattered

timber, while areas of dense, young timber were used least. Wolverines avoided clearcuts and burns, crossing them rapidly and directly when they were entered at all. Wolverines in the Northern Rocky Mountain region are typically associated with fir, pine, and larch. Aspen and cottonwood stands may also be used in riparian areas and riparian areas may be important winter habitat.

Wolverines do not appear to be dependant on any particular vegetative habitat type habitat requirements appear to be large, isolated tracts of wilderness supporting a diverse prey base, rather than specific plant associations or topography. Dispersing individuals can be found far outside of usual habitats.

In the Decision Area, wolverines may be found at high elevation near Great Divide, Mount Thompson, and Sleeping Giant as well as within linkage corridors. The Sleeping Giant area may provide an important linkage corridor for wolverine between the Big Belt Mountains. A dead wolverine was located by MFWP on the Sheep Mountain ridgeline in the Clancy area. Wolverine tracks and cache were observed by MFWP in the Great Divide area within 2-4 miles of BLM lands.

Townsend's Big-eared Bat (BLM Sensitive)

The occurrence of Townsend's big-eared bat has been documented in at least 25 Montana counties (Foresman 2001) including counties in the PA. Lewis and Clark Caverns, along the southern border of the PA, contain one of four known nursery colonies in Montana (Tipton 2004).

A roosting site was documented on BLM land in Soap Gulch (2003) during AML surveys. Ample foraging habitat and extensive limestone outcrops within the PA provide roosting habitat for Townsend's big-eared bats.

Fringed Myotis (BLM Sensitive)

Western Montana is on the northeastern limit of the distribution of fringed myotis (Foresman 2001). Surveys conducted in 2003 on BLM land near the Big Hole River documented fringed myotis in three locations during mist netting. These bats were found between 5,800 to 6,000 feet elevation. Fringed myotis were also detected in five locations using bat detectors.

Long-eared Myotis (BLM Sensitive)

Long-eared myotis are distributed throughout Montana (Foresman 2001). Long-eared myotis were documented utilizing the Big Hole River area during the 2003 surveys conducted on BLM land.

Long-legged Myotis (BLM Sensitive)

Long-legged myotis range throughout Montana (Adams 2003). Mist net surveys conducted on BLM land within the Big Hole River area in 2003 documented long-legged myotis utilizing the area.

Plains Spadefoot (BLM Sensitive)

There are documented occurrences of plains spadefoot in the PA (Maxell *et al.* 2003).

Boreal (Western) Toad (BLM Sensitive)

While still widespread in western Montana, surveys suggest that populations of boreal toads may be declining (Maxell *et al.* 2003). Boreal toads occur in the PA where there is suitable habitat (Maxell *et al.* 2003) and have been found in the Decision Area in Halfway Creek in the Whitetail Pipestone area.

Northern Leopard Frog (BLM Sensitive)

Once widespread in Montana, leopard frogs appear to be extinct over much of western Montana, west of the Continental Divide (Maxell *et al.* 2003). According to Maxell *et al.* (2003), this species is currently known from only two sites west of the Continental Divide and evidence suggests that populations may have been extirpated from Jefferson County.

Greater Short-horned lizard (BLM Sensitive)

Short-horned lizards' distribution is poorly documented east of the Continental Divide (Maxell *et al.* 2003). While there are old records of this species in Gallatin County, the current status of the species is unknown.

Plants

Special-status species are listed as threatened or endangered under the Endangered Species Act, proposed or candidates for listing, or designated as "sensitive" by BLM (Table 3-16).

Musk-root (BLM Sensitive)

Musk-root grows in vernal moist places in mountains, often at the bottom of undisturbed, open rock slides with cold air drainage. There are 11 known occurrences in the state, one historically on BLM land in Jefferson County.

Sitka Columbine (BLM Sensitive)

Sitka Columbine is an herbaceous perennial with stems which are four inches to two feet high and arise from a

**Table 3-16
Special-Status Plants Known or with Potential to Occur in the PA**

Common and Scientific Name	Status	Habitat
Muskroot <i>Adoxa moschattelina</i>	Sensitive 1 occurrence on BLM land	Vernally moist area below talus slopes in mountains
Sitka columbine <i>Aquilegia Formosa</i>	Sensitive No occurrences on BLM land	Moist soil of open coniferous, cottonwood, or aspen forests in the montane to subalpine zone.
Sapphire Rockcress <i>Arabis fecunda</i>	Sensitive 4 occurrences on BLM land	Steep slopes with big sagebrush or mountain mahogany and sparse tree cover on Madison limestone
Lesser rushy milkvetch <i>Astragalus convallarius</i> var. <i>convallarius</i>	Sensitive 6 occurrences on BLM land	Grassland and open pine woodlands
Idaho sedge <i>Carex idahoensis</i>	Sensitive 1 occurrence on BLM land	Moist alkaline meadows, often along streams
American yellow lady's slipper <i>Cypripedium parviflorum</i>	Sensitive 1 occurrence on BLM land	Fen, damp mossy woods, and seepage areas
Linearleaf fleabane <i>Erigeron linearis</i>	Sensitive 3 occurrences on BLM land	Dry, often rocky soil from the foothills up to moderate elevations, frequently with sagebrush.
Prostrate hutchensia <i>Hutchinsia procumbens</i>	Sensitive No known occurrences on BLM land or in PA	Vernally moist, alkaline soil of sagebrush steppe in the valley to lower montane zones
Dwarf purple monkeyflower <i>Mimulus nanus</i>	Sensitive 3 known occurrences in PA	Dry, open, often gravelly, or sandy slopes in the valleys and foothills.
Lemhi beardtongue <i>Penstemon lemhiensis</i>	Sensitive 2 occurrences on BLM land	Moderate to steep slopes often on open soils
Mealy primrose <i>Primula incana</i>	Sensitive Known occurrences in PA	Saturated, often calcareous wetlands
Ute ladies' tresses <i>Spiranthes diluvialis</i>	Threatened No known occurrences on BLM land	Wetlands and swales in broad open valleys, often with calcium carbonate accumulations

Source: BLM and Montana Natural Heritage Program

simple or branched root crown. The plant grows in moist soil of open coniferous, cottonwood, or aspen forests in the montane to subalpine zone. The plant is known from eight locations in southwest Montana near the Madison and Gallatin county boundary.

Sapphire Rockcress (BLM Sensitive)

Sapphire rockcress is an endemic species, known from 21 locations, occurring only in the mountains of southwestern Montana. It is typically found in sagebrush grasslands on steep, dry slopes of limestone-derived soils, on warm exposures with sparse vegetation. It is known to occur in the Decision Area (Silver Bow County) where it grows with mountain mahogany, juniper, or limber pine woodlands. Fire has been frequent in habitats with sapphire rockcress, but the sparse vegetation does not usually carry fires well. Factors that affect the long-term persistence of this species are noxious weed encroachment, grazing and trampling, mining, and herbicide application (MTNHP n.d.).

Lesser Rushy Milkvetch (BLM Sensitive)

Lesser rushy milkvetch is known from 14 locations near Helena, with six of these locations on BLM lands. It grows in grassland and shrublands often in association with bluebunch wheatgrass, fescue species, and mountain big sage.

Idaho Sedge (BLM Sensitive)

Idaho sedge is a regional endemic known from 40 locations in southwestern Montana. One of these occurrences is on BLM land in Silver Bow County. This species grows in moist, alkaline, subirrigated, streamside meadows with other grasses and sedges. Shrubby cinquefoil may also be present. Idaho sedge can withstand light to moderate livestock utilization, but declines under heavy grazing (MNHP n.d.).

American Yellow Lady's Slipper (BLM Sensitive)

There are 72 known occurrences of yellow lady's slipper in Montana, with three in the PA in Lewis and Clark and Gallatin counties. One of these occurrences is on land administered by BLM. This species grows in fens, damp mossy woods, seepage areas, and moist forest-meadow margins in valleys and mountains.

Linearleaf Fleabane (BLM Sensitive)

There are four known occurrences of linearleaf fleabane in the PA; three locations are managed by the BLM in the Scratchgravel Hills area. Mining, grazing, and the encroachment of exotic weeds are factors that may affect long-term population stability. Linearleaf fleabane grows on dry, often rocky soil from the foothills up to moderate elevations, frequently with sagebrush. The low stature of this plant probably means that it responds positively to livestock grazing. Leafy spurge and spotted knapweed threaten populations in the Scratchgravel

Hills. Observations suggest that this species may respond positively to disturbance.

Prostrate Hutchinsia (BLM Sensitive)

Prostrate hutchinsia is an annual that flowers in June and matures in July. The plant grows in vernal moist, alkaline soil of sagebrush steppe in the valley to lower montane zones. The plant has been found in areas adjacent to, but not in the PA itself.

Dwarf Purple Monkeyflower (BLM Sensitive)

Dwarf purple monkeyflower is only known from a few extant occurrences in the state, plus two historical collections. Populations are generally small and in habitats susceptible to weed invasion. The plant is found in dry, open, often gravelly, or sandy slopes in valleys and foothills. It has been found in three locations in the PA, one of which is adjacent to land managed by the BLM.

Lemhi Beardtongue (BLM Sensitive)

There are 83 known occurrences of Lemhi beardtongue in southwestern Montana, including two in Silver Bow County on land administered by the BLM. This regional endemic, occurring only in southwestern Montana and adjacent Idaho, grows on moderate to steep east and southwest-facing slopes in habitat dominated by sagebrush and bunchgrasses. Fire suppression may be a factor in the range-wide decline. Monitoring studies in Beaverhead County have found that recruitment dramatically increased after fire treatment, consistent with tendency of fire-adapted species to emerge from seed banks following removal of litter and duff (MNHP n.d.).

Noxious weed infestations, especially spotted knapweed tend to invade habitats occupied by Lemhi beardtongue, especially following fire.

Mealy Primrose (BLM Sensitive)

Mealy primrose is known from 22 locations in Montana of which 10 are in the PA. This species grows in saturated wet meadows, often calcareous, with sedges and grasses adapted to wetland growing conditions. Livestock grazing can have variable effects on mealy primrose. Grazing by livestock removes seed heads but does not kill the plant and associated removal of sedges and grasses by grazing reduces shading and allow regrowth from the basal rosettes. Lowered water tables, through draining of wetlands or channel downcutting are the primary threat (MNHP n.d.).

Ute Lady's Tresses (Threatened)

This rare orchid is known to occur at 12 sites in Montana, all on private or state land, mostly in Gallatin, Jefferson, Madison, and Broadwater counties. It grows in wetlands and swales and wet meadows in broad, open valleys, with calcareous carbonate accumulations. It grows in the Piedmont Swamp in Jefferson County.

WILDLAND FIRE MANAGEMENT

Historic Fire Regime

Coarse-scale definitions for historical fire regimes were developed by Hardy *et al.* (2001) and Schmidt *et al.* (2002). The historical fire regimes are based on average years between fires (frequency) combined with the severity (amount of replacement). The regimes are shown in **Table 3-17**. Historic fire regimes for the PA are shown on **AMS Figures 2-11a, 2-11b, and 2-11c**.

Fire Regime Condition Class

A Fire Regime Condition Class (FRCC) is a classification of the departure from the historic fire regime (Hann and Bunnell 2001). The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. **AMS Figures 2-12a, 2-12b and 2-12c** shows fire condition classes for the PA.

In FRCC 1, vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances are considered within the natural (historical) range of variability. Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. The risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.

In FRCC 2, there is a moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. Fire behavior, effects, and other associated disturbances are moderately departed.

Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate and the risk of loss of key ecosystem components is moderate.

In FRCC 3, there is a high departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances. Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high and the risk of loss of key ecosystem components is high.

Generally, the consensus among fire ecologists (Brown and Smith 2000; Crane and Fisher 1986; Hardy and Arno 1996) is that the structure and composition of most forest communities in the west, including the PA, have been altered by exclusion of natural cycles of fire. Fire suppression in the last century has reduced the frequency and spatial extent of fires in many forest communities. Fire suppression generally has lengthened intervals between fires, contributing to the creation of dense stands with high levels of fuel.

The paradigm most often adopted relative to the historic role of fire is that low to moderate intensity fires increases dominance of Douglas-fir and ponderosa pine on relatively dry sites. These periodic fires pass through the forest, burning needles and debris on the forest floor and lower branches of trees. Fires reduce numbers of seedlings; remove dense understories of saplings and pole-size trees, and thin overstory trees. Prior to fire suppression efforts, fire rarely reached the tree crowns and therefore usually did not kill the large, mature ponderosa pine and Douglas-fir. Exposure of mineral soil, in openings caused by fire, perpetuated reproduction of Douglas-fir and ponderosa pine in a mosaic pattern.

Under pre-settlement fire regimes, low-elevation forests were often more open. Pre-1900 fires often covered large areas and were characterized by uneven burning patterns that resulted from the mosaic pattern of stand structure. Past burn mosaics increased the probability that subsequent fires would also burn in a mixed pattern (Brown and Smith 2000).

Table 3-17 Historic Fire Regimes	
Regime	Frequency and Severity
I	0–35 year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced).
II	0–35 year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced).
III	5–100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced).
IV	35–100+ year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced).
V	200+ year frequency and high (stand replacement) severity.

Source: Hardy *et al.* (2001) and Schmidt *et al.* (2002)

Prior to aggressive fire suppression, wildfires of variable intensity and severity periodically occurred. Stand-replacement fires, especially in the cool Douglas-fir and subalpine fir types were the norm under pre-settlement conditions.

Fire suppression is the most extensive cause for departure from the historic fire regime. However, other causes include invasive species (e.g. weeds, insects, and diseases), management activities affecting forest composition and structure (e.g. large trees removed in a frequent surface fire regime), and grazing.

Current Wildland Fire Management

Table 3-18 outlines the Fire Management Zones and their predominant Fire Management Categories in the Fire/Fuels Management Plan.

Current policy is to control all wildfires burning on or threatening public land within the first burning period. Modified suppression areas were established based on consideration of the following criteria:

- Values at Risk.
- Fire behavior.
- Fire occurrence.
- Beneficial fire effects, including but not limited to a reduction of fuel loading.
- Fire suppression costs.
- Consistency with other agency plans and policies.

Wildland Fire History

According to the Butte Field Office Fire Management Plan, there were 194 reported wildland fires between 1980 and 2003, of which 53 percent were human-caused. Local fire departments (non-federal) may or may not report wildland fires to the BLM. An average of eight fires burned an average of 1,348 acres per year (USDI-BLM 2004f).

Direction for fire and fuels management needed to protect other resource values and broad levels of treatment over 10 years, as described in the Fire/Fuels Management Plan are shown by category in **Table 3-19**.

Fire Management Zone¹	Category	FMZ Acres²	BLM Acres in FMZ²
1. Absoraka Foothills	C	67,700	3,900
2. Big Belt Mountain	C	360,300	7,200
3. Big Hole River Corridor	C	68,800	11,100
4. Blackfoot (See Missoula Field Office)	C	340,800	0
5. Boulder River	B	264,400	14,300
6. Clancy/ Marysville	C	299,600	28,200
7. Elkhorn Mountains	C	482,900	68,900
8. Fleecer Mountain	C	284,300	18,100
9. McCartney/ Rochester	C	273,600	28,100
10. North Hills	B	33,900	6,300
11. Pipestone	C	369,300	41,000
12. Scratchgravel Hills	B	126,900	7,900
13. Sleeping Giant/Sheep Creek	C	82,600	20,500
14. Spokane Hills and North	B	156,500	6,800
15. Three Forks	C	485,000	31,200
16. Wise River Townsite	B	10,100	1,400
17. Bozeman/ Livingston Scattered Tracts	A	1,714,300	7,300

Source: USDI-BLM 2004b

¹ Category and associated treatments only apply to BLM land within each zone.

² Acres are approximate.

Table 3-19 Fire Management Categories			
Category A	Category B	Category C	Category D
Description			
Fire is not desired at all (8,000 acres).	Unplanned fire is likely to cause negative effects (81 million acres).	Fire is desired to manage eco-systems, but current vegetative condition creates constraints on use (252 million acres).	Fire is desired; no constraints on its use (200 acres).
Fire Management Activities			
Mitigation and suppression required. Fire should not be used to manage fuels.	Suppression required. Fire and non-fire fuel treatments may be used	Suppression may be required. Fire and non-fire fuel treatments may be used	Suppression may not be necessary. Both fire and non-fire treatments could be used
Rationale for Categorization			
Direct threats to life or property. Eco-systems not fire dependent. Long fire return intervals.	Unplanned ignitions would have negative effects on ecosystems unless mitigated	Significant ecological, social, or political constraints	Few ecological, social, or political constraints. Less need for fuels treatment.
Fire Suppression Considerations			
Emphasis on prevention, detection, and rapid suppression response and techniques.	Emphasis on prevention/education and suppression.	Emphasis on reducing unwanted ignitions, resource threats, and fuels accumulations.	Emphasis on using planned and unplanned wildfire to achieve resource objectives.
Multiple Fire Priority¹			
Highest	High	Medium	Lowest
Anticipated type and level of fire/fuel treatments, including treating areas that were previously treated:			
<1,000 acres mechanical	105,000 acres prescribed fire 74,000 acres mechanical 37,000 acres chemical weed treatment	192,000 acres prescribed fire 84,000 acres mechanical 149,000 acres chemical weed treatment	2,000 acres fire use or prescribed

Source: H-1601-1 Land Use Planning Handbook (USDI-BLM 2005a) and IM No. 2002-034

¹If multiple fires were burning, Categories A and B would generally receive priority for fire management resources.

CULTURAL RESOURCES

Currently in the Butte Field Office there are 1,174 historic properties. Of these, 538 are prehistoric sites, 506 are historic sites, eight contain both prehistoric and historic components, and 130 sites on private land were recorded due to the effects of federal projects. In addition, 63 sites have been determined to be eligible for listing on the National Register of Historic Places, and 65 sites that have been determined not to be eligible for listing. The Butte Field Office has two historic properties listed on the National Register: the Crow Creek Ditch-and-Flume System, and the McCormick Feed and Livery sign. The Butte Field Office boundaries host segments of two national trail systems; the Lewis and Clark National Historic Trail, and the Continental Divide National Scenic Trail.

Cultural Resources managed by BLM are assigned to one of six Use Categories, summarized as follows:

Scientific Use Applies to any cultural property determined to be available for consideration as the subject of scientific or historical study at the present time, using currently available techniques.

Conservation for Future Use This category is reserved for any unusual cultural property which, because of scarcity, a research potential that surpasses the current state of the art, singular historic importance, cultural importance, architectural interest, or comparable reasons, is not currently available for consideration as the subject of scientific or historical study that would result in its physical alteration.

Traditional Use This category is to be applied to any cultural resource known to be perceived by a specified social and/or cultural group as important in maintaining the cultural identity, heritage, or well being of the group.

Public Use This category is applied to any cultural property found to be appropriate for use as an interpretive exhibit in place, or for related educational and recreational uses by members of the general public.

Experimental Use This category is applied to a cultural property judged well-suited for controlled experimental study, to be conducted by BLM or others concerned with the techniques of managing cultural properties.

Discharged from Management This category is assigned to cultural properties that have no remaining identifiable use.

Complete Use Category definitions are located in **Appendix K – Cultural Resources**, subsection .42; A-F.

Prehistoric Sites

Prehistoric sites from each of the cultural periods identified for the Northwestern Plains region have been documented in southwest Montana. The oldest occupations in the PA come from the Paleo-Indian period, about 12,000 to 8,000 years ago.

An increase in occupational intensity during the Middle Plains Archaic (ca. 5,000–3,100 Before Present [B.P.]) is evidenced by comparatively frequent occurrence of projectile points diagnostic of the McKean technocomplex. This increase in prehistoric use is punctuated during the Late Plains Archaic (ca. 3,100–1,400 B.P.). Corner-notched Pelican Lake-type projectile points are more profuse than any other single diagnostic point style identified in southwestern Montana (Davis *et al.* 1980; Deaver and Deaver 1986; Foor 1994). The Late Prehistoric Period (ca. 1,400–200 B.P.) is also represented, corresponding with an era of increased moisture and resultant improved habitat conditions for buffalo and other large ungulates (Bryson *et al.* 1970; Fredlund 1979). Side-, corner-, and tri-notched arrow points, characteristic of the “Old Women” type, commonly occur in association with open camps, communal kills, lithic workshops, and as isolated finds (Davis *et al.* 1980; Taylor *et al.* 1984; Deaver and Deaver 1986).

While occupational intensity varied through time, site patterns appear to have remained relatively constant. The majority of prehistoric sites, regardless of their age or apparent cultural affiliation, can be classified into one of seven types based on their suspected functions or the presence of unique attributes. The types include: 1) lithic scatters, 2) habitations, 3) stone cairns and alignments, 4) toolstone quarries, 5) hunting sites, 6) rock art and ceremonial sites, and 7) trails.

Lithic scatters are the most commonly identified sites. They consist of concentrations of waste flakes and occasionally cores and complete or broken tools. Lithic scatters may reflect a range of functional activities, from the initial reduction of locally obtained toolstone to the production of formal tools such as projectile points or scrapers. While some lithic scatters may mark the former locations of prehistoric camps, the absence of domestic artifacts and features suggests that they generally represent brief, intermittent occupations. This site type is pervasive throughout southwest Montana and occurs in nearly all environmental settings. Deaver and Deaver (1986) found that of the 199 sites recorded in the Decision Area within Broadwater, Deer Lodge, Gallatin, Jefferson, Park, and the southern half of Lewis and Clark Counties prior to 1986, 121 (61 percent) are lithic scatters.

Habitations are the second most common prehistoric site type in southwest Montana. They range from small, briefly occupied field camps to expansive base camps containing features attributable to multiple extended-family groups. These sites typically have evidence of hearths (fire-cracked rock concentrations), and artifactual remains of food processing and/or preparation. The remains of residential structures are occasionally apparent and may consist of natural land form features, such as rock shelters, or purposefully constructed dwellings. In general, researchers believe that the stone rings found

at some habitation sites were used to hold down the covers of tipis.

Stone cairns and alignments occur in a wide range of environmental settings in southwest Montana, and many have been recorded in the Planning and Decision Areas. Individual features take a range of forms and based on their landscape position, it is occasionally possible to determine site functions. Linear arrangements of cairns often designate prehistoric trails or may have functioned as drive lines for communal kills. Isolated features or small groups of cairns located on prominent ridge lines or mountain crests may mark vision quest sites or other ceremonial activities.

Toolstone quarries are areas where prehistoric peoples obtained raw materials to be used for the manufacture of stone tools. Quarries are associated with exposures of fine-grained glassy rocks such as chert, chalcedony, quartzite, and vitreous basaltic stone.

Hunting Sites represent areas where groups of people worked collectively to force small herds of ungulates - including bison, pronghorn, and bighorn sheep - into preselected kill areas. Communal kills are the best documented of the prehistoric hunting sites in southwest Montana. Often the animals were herded over cliffs, where the fall killed or maimed them. In other cases, brush or pole enclosures were constructed and once animals were herded inside they were killed using projectiles or blunt instruments. Communal kills generally contain dense animal bone deposits, as well as associated projectile points and meat/hide processing tools. Kill sites usually occupy lowland settings along major rivers or streams that provide topographic features favorable for herding and containing/killing animals. Small numbers of sites representing this type have been recorded within PA (Scarborough 1975; Deaver and Deaver 1986).

Hunting blinds are another type of prehistoric hunting site known to exist in southwest Montana, including the Decision Area (Kiely, pers. comm. 2003). A hunting blind typically is found near a game trail or watering spot, and usually appears as a crescent-shaped rock. They were built and used by prehistoric people to lay-in-wait in order to ambush game.

Rock art and ceremonial sites represent highly personal cultural manifestations that are oftentimes inter-related. In southwestern Montana, rock art sites consist entirely of pictographs—images that are painted on rock faces, boulders, or other outcrops. They typically appear as monochrome panels with simple line drawings of human figures, animals, tally marks, and geometric designs. Rock art sites often occupy vertical bedrock faces that form narrow canyons at the mouths of tributary streams (Greer and Greer 1998).

Trails used by prehistoric people originally linked all the major valleys and ridge line systems in southwestern Montana. Few however, have been documented, in large

part due to modern alterations to their associated features. The Old North Trail and the Indian Creek Trail are two examples of routes used by prehistoric people in Montana. There is no consensus about the locations of these trails, however.

Historic Sites

Mining-related sites are the most common historic sites in the PA. These sites span from the period from the early 1860s to after World War II, and many retain evidence of more recent development. Site complexity ranges from individual prospect pits and test trenches to concentrations of adits, shafts, waste-rock dumps, and remains of industrial structures such as mills. Placer mining sites also exist in the PA and almost universally are identified by accumulation of placer tailing (man- or machine-made piles of gravel) along a creek or river. A placer mine is often accompanied by a network of ditches and dams. Residential buildings in various states of decay and other domestic features can be found at both lode and placer mine sites. The PA also contains remnants of towns (in various states of decay) that appeared in response to the residential, commercial, and social needs of miners and their families. The bulk of the larger and/or complex mine sites and towns are on private rather than public land (McDaniel 1975; McCormick and Quivik 1991; Park 1993a; Park 1993b; Sanders 1993; Sanders 1996; Peterson and Melhs 1996; Rossillon 1997; Travis 1997a; Travis 1997b; Sanders and Walker-Kunz 1998; Fairchild and Horstman n.d.a; Fairchild and Horstman n.d.b).

Most mining-related sites lie within districts, organizational frameworks historically imposed over a fairly concentrated area of mining activity. Historic mining districts all or partly within the Decision Area include Austin, Boulder, Clancy, Colorado, Confederate Gulch, High Ore Creek, Marysville, McClellan/Mitchell, Melrose, Indian Creek, Pipestone, Radersburg, Scratchgravel Hills, Stemple, Whitehall, and Winston. Most of these districts have been minimally recorded to date. The great copper mining and smelting complex of Butte-Anaconda is also within the PA. Unlike most other mining districts in the area, it has been subject to intensive inventory.

Agricultural-related resources are the second most common historic site type documented in the PA. Due to the region's short growing season, large farmsteads and/or homesteads are rare, especially in comparison to much of eastern Montana. Raising livestock rather than cultivation of crops (other than hay) dominated the region's agricultural development. Cattle and sheep ranches and dairy farms tend to be widely scattered in favorable areas such as along streams and near upland springs, and with few exceptions are located on patented (i.e., private) rather than public land. A variety of site types which historically played ancillary roles in ranching/farming operations have been documented within the Decision Area. The most prevalent of these site types are

dams and ditches, cow camps, sheep camps, line shacks, and isolated corrals (Davis *et al.* 1980).

Several historic roads and railroad lines also exist in the PA. Road and railroad alignments are mostly confined to private land and, in the case of roads, state-owned land. Similar to agricultural properties, sites secondary to the development and/or use of a road or railroads have been identified in the Decision Area. To date these include construction camps and signs. Some of the other more common historic properties known to exist in the PA are timber camps and sawmills, and remnants of trails and/or wagon roads. A few isolated graves and an airplane crash site have been recorded in the Decision Area (Stoner 1981; USDI-BLM 1983; McCormick 1997).

Several of the known cultural resource sites in the Decision Area have been determined eligible for listing in the National Register of Historic Places. Of these, however, only two sites have been listed.

PALEONTOLOGICAL RESOURCES

Paleontology is a discipline that combines biology and geology in the study of fossils. Fossils are paleontological resources that include the body remains, traces, or imprints of plants or animals that have been preserved in sedimentary deposits during past geologic or prehistoric times.

Fossils and fossil-bearing deposits occur in Paleozoic, Mesozoic, and Cenozoic rocks throughout the PA, and range in age from 600 million years to recent. Important fossil resources within the PA focus on vertebrate fossils that are of scientific interest from a variety of points of view (for example: dinosaur skeletons, nests and eggs, turtle remains, or horses and camels). Most of these vertebrate fossils occur in Cenozoic Era rocks, from the Paleocene to the Pliocene, approximately 65 million to 1.6 million years ago. In the PA, the Cenozoic fossils come mostly from Eocene and Miocene epochs. These strata are most well known for containing horses and camels.

Paleozoic and Mesozoic sediment (deposited 600 million to 65 million years ago) in the PA most commonly contain marine invertebrates, although non-marine invertebrates, fish and reptiles occur as well. Within these various sedimentary units, fossil density and occurrence ranges from sparse to abundant. Some individual sedimentary beds are composed of predominantly fossil and shell fragments (fossiliferous), while others may rarely contain fossils. The Madison, Kootenai, and Morrison formations are important stratigraphic units that contain these fossils (Davis *et al.* 1980). The stratigraphic section has been described in some detail by Freeman and others (1958) and Klepper and others (1971). Their work indicates which sedimentary units contain fossils, the most commonly observed fossil types, and occasionally provide an indication of the fossil density or abundance. Exposures and fossil occurrences in the Paleozoic and

Mesozoic stratigraphic units of the PA are similar to those found commonly across southern Montana and are, therefore, not considered to be either unusual or unique (Davis *et al.* 1980).

GIS analysis for the PA shows that only three fossil specimens have been recorded as flying reptiles; seven fossil specimens have been terrestrial dinosaurs; 61 specimens have been marine reptiles, and 189 specimens have been fossil mammals. By far the most productive formations are Tertiary sedimentary rocks and sediments. The largest collection of recorded paleontological localities (60) is located in Jefferson County, containing mixed specimens of mammals and marine reptiles. But while Jefferson County has the largest number of recorded fossil localities and specimens, no terrestrial dinosaurs are included in those known localities.

VISUAL RESOURCES

The visual resource inventory includes a general discussion regarding VRM Classes. Under the current Headwaters RMP, specific VRM Classes were assigned to areas characterized by high visual resources (river corridors and Wilderness Study Areas). All other public land was not designated a specific VRM Class until a project occurred in that area. At that time, VRM Classes were assigned according to BLM's VRM Handbook.

VRM Class I was assigned to WSAs. Management practices within this class must not be noticeable by the casual observer.

VRM Class II was assigned to special recreation areas or Areas of Critical Environmental Concern and some river corridors. VRM II allows for minimal visual disturbance from management activities that should be indiscernible to the casual observer.

VRM Classes have been assigned to some land based on specific project plans within the PA since 1983. VRM Classes consider special management areas, key observation points, scenic quality, distance zones, and sensitive areas.

RESOURCE USES

FOREST AND WOODLAND PRODUCTS

Table 3-20 summarizes the commercial forest land acres. The Decision Area contains 87,797 acres of commercial forest land. Under current BLM policy (BLM Manual 5251.11), forest and woodland stands are classified as commercial forests when they are producing or capable of producing at least 20 cubic feet of wood per acre per year of commercial tree species. The predominant commercial species are Douglas-fir, lodgepole pine, and ponderosa pine, with minor amounts of subalpine fir and spruce.

Table 3-20
Summary of Forested Acres in the Decision Area

Designation	Acres
Total Forested Acres (CFL + woodland)	110,350
Commercial Forest Land (CFL)	87,797
Suitable CFL	82,815
Nonsuitable CFL	4,982
CFL Set Aside for Wildlife ¹	8,035
CFL Set Aside for Recreation	7,076
CFL Set Aside for Wilderness Recommendations	7,939
Total CFL Set Aside	28,032
Total Available Base (Suitable CFL-Total CFL Set Aside)	54,783
TPCC Restricted Base ²	42,650
Non-restricted Base (Total Base Restricted Base)	12,133
Allowable Cut (million board feet per decade)	27.21
Miles of Road Construction (Miles of Permanent road per decade)	55
Acres Cut per Decade (@ 3 thousand board feet per acre)	9,069

CFL = Commercial Forest Land

TPCC = Timber Production Capability Classification

¹ Set Aside – Forest areas that have been removed from general forest management and the use of silvicultural techniques to meet forest production goals.

² TPCC Restricted Base – Forest areas where specific silvicultural treatment methods and/or techniques may be restricted on a case-by-case basis to prevent or mitigate specifically identified resource impacts.

The forested acres have changed since 1984 due to a change in the Decision Area boundary and several large land exchanges.

Approximately 5,169 acres of forested public land in the PA has been treated by forest management since 1984. The majority of forest treatments were selective harvests in mature stands. Nearly half of the acres (2,052 acres) treated since 1984 where forest salvage and restoration planting treatments on a portion of the 5,178 acres of commercial forest burned by wildfires in 2000. Wildfire suppression has kept forest structure changes from wildfire to less than one percent of all disturbances.

Approximately 60 to 80 percent of the forest land effected by the larger wildfires in the Decision Area were completely consumed by stand replacement fire intensities, potentially resulting in a quarter to half of the area considered to be deforested as very little seed source remains for natural regeneration.

An estimated 29,000 areas of conifer colonization of grass-shrub vegetation types has occurred over the last several decades with similar conifer establishment problems developing in the open forest types, dry forest meadows and woodlands that have become heavily overstocked by young conifer trees as well, converting stands to high fuel loadings and closed canopy conditions, particularly in the WUI.

In the 1984 Headwaters RMP estimated resources could support an annual allowable cut of 2.6 to 2.9 million

board feet. The estimate amounted to an average of 867 acres per year or a total of 17,333 acres over the 20 years since the 1984 plan was established.

There are 22,553 acres of woodland, which are forest communities often occupied by noncommercial species such as limber pine, juniper, mountain mahogany, or quaking aspen, and are often accompanied by Douglas-fir and ponderosa pine. **Table 3-21** presents a summary of forested woodland acres by county.

Table 3-21 Summary of Woodland by County, Butte DA	
County	Current Woodland Acres
Beaverhead	271
Broadwater	4,935
Deer Lodge	18
Gallatin	409
Jefferson	9,139
Lewis and Clark	5,570
Park	506
Silver Bow	1,705
Total	22,553

LIVESTOCK GRAZING

Of the approximately 307,309 acres of public land in the PA, 273,039 acres are managed as part of 237 grazing allotments ranging in size from 4 acres to 13,118 acres. Thirteen allotments are currently vacant. Seven allot-

ments are managed by other BLM or USFS offices. The number of allotments grazed by cattle, horses, and sheep is 210, 5, and 3 respectively, with three additional allotments grazed by both cattle and sheep and one grazed by both horses and sheep. Resource allocation within an allotment is based on AUMs (the amount of forage needed to sustain one animal unit, or its equivalent, for one month). AUMs required for livestock are based on the nutritional needs specific to each livestock class. The domestic livestock permitted to graze on allotments in the PA includes cattle (24,139 AUMs), sheep (1,286 AUMs), horses (240 AUMs), and buffalo (12 AUMs). **AMS Table 2-15** displays allotment information in a tabular form. **AMS Figures 2-13a, 2-13b and 2-13c** show the grazing allotments in the PA.

Grazing Permits and Leases

The following Affected Environment discussion is based upon the grazing regulations and guidance in effect at the time the RMP was published. New regulations with a few legally challenged exceptions become effective August 11, 2006.

Grazing preference or preference is defined as a superior or priority position against others for the purpose of receiving a grazing permit or lease. Grazing use in the allotment is authorized through issuance of grazing permits or leases. The permits and leases and attendant activity plans describe the livestock class, intensity, duration, and timing of grazing as well as fences, water developments, and other range improvements to be installed. BLM analyzes effects of proposed grazing according to the NEPA process and prepares an Environmental Assessment (EA) prior to permit issuance or renewal. Most permits and leases are valid for a period of 10 years.

Details of management may be incorporated into an Allotment Management Plan that becomes part of the lease or permit. These plans include grazing instructions specified to meet resource condition, sustained yield, multiple uses, economic, and other objectives. In the PA, the trend is to focus more on reviewing management during the rangeland health evaluation process rather than to develop new plans (Thompson, pers. comm. 2004a). Currently, 41 of the 226 allotments (18 percent) have approved Allotment Management Plans. Five of these are Coordinated Resource Management Plans (CRMPs) developed in conjunction with USFS land in the PA.

The BLM authorizes permittees to use the land for grazing by establishing an allocated amount of forage a permittee may graze on an allotment (this is referred to as "active use"). A permittee may enter temporary nonuse status when operators do not wish to graze for financial, operational, or related reasons or where resource conditions do not allow for grazing. Alternatively, if excess resource is available as a result of favorable weather and good growth conditions, the BLM may temporarily

authorize the permittee to graze in excess of the established level of use. If the permittee chooses to allow another operator to graze livestock on their permitted allotments livestock control agreements must be filed with and approved by the Authorized Officer.

Range Health Standard Assessments

The conditions of resources on each allotment are determined through assessment and monitoring. From these assessments, the potential impacts of grazing are evaluated in the context of standards for rangeland health and guidelines for grazing administration. A BLM interdisciplinary team evaluates allotments in accordance with established rangeland health standards and guidelines. Standards are descriptions of the desired condition of the biological and physical components and characteristics of rangeland. Guidelines are management approaches, methods, and practices that are intended to achieve a standard.

Allotment evaluations include identification of factors influencing the condition of the resources. Where current grazing management practices or levels of grazing use on the public land are a significant factor in failure to achieve rangeland health standards, BLM has until the next grazing season to start implementing corrective actions.

Such actions may include adjustment to grazing duration, timing, intensity, forage utilization, or installation or implementation of range improvement projects. Permittees, interested publics and other agencies are consulted and actions are analyzed according to the NEPA process prior to implementation of corrective actions. To date, 110 allotments have been assessed as to whether they meet Land Health Standards.

Permanent monitoring points established in accordance with the objectives of the 1984 RMP planning effort are used to evaluate upland and riparian sites throughout the PA. Upland monitoring stations are located in key areas and include transects assessed using Daubenmire's method of ocular plant cover estimation and photo points. Riparian areas and wetlands are primarily monitored using cover board photo points (Thompson, pers. comm. 2004a). The trend observed in long-term monitoring of these locations is used to assess the health and condition of these areas and provide a basis for adjusting management, including grazing, as appropriate.

Range Improvement Projects

Range improvements are installed and projects are implemented to improve condition or facilitate management of resources. In the PA, most range improvements consist of items such as fences, wells, and spring developments. Fences are used to keep livestock of various permittees' separate, control the season of use, and exclude grazing from selected areas. Water improvements help improve distribution of livestock and alleviate pressure on natural water sources such as streams and wet-

lands as well as providing water for some species of wildlife. Other range improvement projects such as prescribed burning are used to produce an immediate change in vegetative or environmental conditions that will lead to improved rangeland health or utility.

Range improvements can be authorized on public land under a Cooperative Range Improvement Agreement or Range Improvement Permit. Cooperative Range Improvement Agreements are used to authorize permanent structural improvements such as reservoirs. Range Improvement Permits only authorize installation of removable improvements such as livestock handling facilities. Proposed projects funded by BLM are prioritized based on evaluation of the need and costs as they relate to expected benefits. All improvements are constructed according to BLM standards and specifications.

Prohibited Acts

Permits or leases and preference may be cancelled and civil penalties may be applied as a result of grazing rules violations. The BLM is responsible for monitoring use on the land it administers.

Factors Influencing Grazing

A variety of environmental, economic, and social factors weigh heavily in planning decisions related to livestock grazing in the Decision Area. Grazing management is adjusted during renewal of permits and leases and at other times as appropriate in response to these factors. Site-specific factors influence management to a more notable degree, but the following factors influence grazing management in each of the management areas.

Wildlife Habitat

One objective of allotment management is to maintain and, where possible, enhance wildlife habitat. Protection of federally listed species and species of special concern occasionally requires intensive management that is sensitive to the wildlife needs. In addition, maintaining available forage for big game animals, especially on winter range, can conflict with livestock grazing. Livestock grazing is adjusted as appropriate to ensure wildlife habitat requirements are taken into account in accordance with the 1984 Headwaters RMP.

Riparian Areas and Wetland

Riparian and wetland areas are integral to maintaining many ecosystem processes and maintaining their health and function is a high priority. Succulent vegetation, shade, and water are often associated with these areas. Issues related to riparian and wetland conditions are a dominant factor driving changes in allotment management. While most upland communities meet condition and health standards, riparian areas frequently are in need of more intensive management to improve conditions. During review of grazing leases and permits, appropriate management tools and guidelines for grazing

management options are considered and prescribed as necessary to improve the condition of riparian and wetland areas (Thompson, pers. comm. 2004b).

Noxious Weeds

Noxious weeds effectively compete against native vegetation for resources and continue to expand in the PA. These weeds are unpalatable to most classes of domestic livestock and their expansion reduces the amount of available forage. Control of noxious weeds is an integral part of allotment management.

Forest Encroachment

Encroachment of forests onto areas traditionally managed as rangeland impacts utility of the area for use by livestock by reducing herbaceous productivity and forage availability. As forest stands colonize rangeland, palatable species are replaced by woody species and sparse understory vegetation. The reduction in available forage reduces the carrying capacity (AUMs) of the area, thereby restricting livestock grazing until such time as rangeland vegetation is allowed to reestablish. This reduction in forage also increases livestock and wildlife conflicts as they compete for the same resource.

Urban Interface and Recreational Conflicts

Subdivisions and land purchased for recreational purposes has an effect on allotment management and grazing. Frequently, private land next to or near allotments is sold to private citizens not engaged in the livestock business. The change in land use adjacent to public land directly influences the use of public land. Increased recreational use, increased public awareness of livestock use, and improved access often result in conflicts.

MINERALS

Mineral uses are divided into four categories based on laws regarding their disposition:

- Leasable fluid minerals, which includes oil and gas, coal bed natural gas (methane), and geothermal resources;
- Leasable solid minerals (coal);
- Locatable minerals (metals, some limestone and building stone); and
- Salable minerals (sand and gravel, some limestone and common varieties of flagstone).

Leasable minerals are defined under the Mineral Leasing Act (February 1920; 43 CFR 3000-3599, 1990) and include: coal, phosphate, oil, oil shale, gas, sodium, native asphalt, and solid and semi solid bituminous rock. In more recent years, potash and geothermal resources, and sulphur in New Mexico and Louisiana, were added to minerals that are considered leasable. The rights to these minerals on public land may only be acquired by

competitive leasing. In the discussion below, leasable minerals are divided into fluid and solid.

Locatable minerals are minerals for which the right to explore or develop the mineral resource on federal land is established by the location (or staking) of lode or placer mining claims and is authorized under the General Mining Law (May of 1872). Locatable minerals include metallic minerals (gold, silver, copper, lead, zinc, molybdenum, uranium, etc) and non-metallic minerals (fluorspar, asbestos, talc, mica, limestone, etc).

Salable minerals were designated under the Materials Act (July 1947), which authorizes the disposal of petrified wood, and common varieties of sand, stone, gravel, pumice, cinders, and clay through a contract of sale or a free use permit. Uncommon varieties of these same minerals are locatable.

Much of the information provided in this section regarding the potential for mineral resources in the PA is derived from the Butte Field Office Mineral Potential Report (Kirk 2005).

LEASABLE FLUID MINERALS

Oil and Gas

There are no producing oil and gas wells in the Butte Field Office. Recent activity within the BFO includes 14 dry holes drilled since 1983. (If no economically producible oil or gas is discovered, a well is called a “dry hole”). One well has been drilled to total depth in Park County and another spud in. The first well is to be tested in the fall of 2007. By 1982, much of the BFO had been leased. However, as leases expired, very few leases were issued after 1988. Currently there are 98 authorized federal oil and gas leases (including Forest Service minerals) within the Planning Area (PA) covering 143,739 acres. In addition, approximately 37,732 acres are covered by suspended lease nominations, pending completion of this RMP.

With respect to oil and gas resources, the Butte Field Office is partially within the Rocky Mountain (Montana) Overthrust Belt and partially within the Southwest Montana Province (USGS 1995; Perry 1995a-b). Both areas are considered highly prospective for oil and gas. Both source rocks abundant in organic carbon and porous reservoirs exist in the Paleozoic stratigraphic section. Faults and folds related to these structural provinces have produced structural traps for oil and gas. The historically productive Central Rocky Mountain Foreland Province lies to the east of the Rocky Mountain Overthrust Belt and immediately to the north and east of the PA.

Knowledge of the existing geologic setting for oil and gas resources in the PA is based on bedrock geologic mapping, geophysical data, and the 110 dry oil and gas wells drilled in the general area of the PA (AMS Figure 2-2). While 110 wells may seem like many tests, only 37

of those wells were drilled to a depth of 5,000 feet or more. Only 21 of those deep tests were located within the boundaries of the Butte Field Office. The wells shallower than 5,000 feet did not adequately test the area.

Occurrence and Development Potential

To provide guidance to planners on possible future oil and gas activity, the BLM uses a two stage mapping process, called: 1) occurrence potential; and 2) development potential mapping (USDI-BLM 2004a). Occurrence potential is a measure of the likelihood of an area to contain oil and gas, regardless of current economics and current accessibility to the area. Development potential is the current estimate of the probability that oil and gas drilling will occur in the future. Both types of mapping are dynamic and can change as new data becomes available. In frontier areas like southwest Montana where drilling is sparse, one deep test or discovery well can rapidly change the occurrence and development potential of an area.

The following factors are evaluated when creating occurrence potential maps:

- The existence (or lack) of USGS designated oil and gas plays,
- The thickness of the sedimentary rock package, the existence (or lack) of producing oil and gas fields,
- The presence (or lack) of buried source rocks with the potential to generate hydrocarbons,
- The presence (or lack) of reservoir rocks (the hydrocarbon “sponge”), and
- The presence (or lack) of adequate hydrocarbon seals and traps.

The USGS has used “play analysis” in the preparation of their national oil and gas assessments. A play is a set of discovered or undiscovered oil and gas accumulations that exhibit nearly identical geological settings and characteristics. Therefore, a play is defined by the geological properties responsible for the real or potential accumulations of oil and gas resources. In the USGS assessments, only oil and gas accumulations of at least one million barrels of oil (MMBO) or six billion cubic feet of gas (BCFG) are considered when plays are defined and assessments of significant resources are made. In the national USGS analysis about 700 plays are grouped into 72 provinces that, in turn, are grouped into eight regions. This PA covers parts of two provinces, the Montana Overthrust and Southwest Montana Provinces and contains all or parts of ten plays. Seven of the plays are hypothetical because there has been no production associated with the plays and three of the plays are confirmed as there has been some historical production, but not within the PA.

The potential for occurrence of oil and gas in the Butte Field Office PA has also been classified by BLM staff geologists and summarized in the mineral report prepared for this RMP. Occurrence potential is shown for

the entire PA on **Figure A-1** in **Appendix M – Fluid Minerals**, including congressionally designated wilderness areas, since the occurrence potential is based solely on geology, which continues beyond the wilderness boundaries. Areas classified as having a high potential for occurrence of oil and gas are reserved for proven oil and gas producing provinces. There are no areas of “high” oil and gas occurrence potential in the PA. This is because of the distance to the nearest producing field. Moderate occurrence potential means an area with an apparent unmetamorphosed sediment thickness above the Precambrian Archean basement rocks of 2,500 feet or more in a currently non-productive province and containing probable source rocks and reservoir beds. Low occurrence potential areas were classified using two slightly different standards. Under the first, they are areas having sediments with less than 2,500 feet of thickness or those areas with insufficient evidence to learn the thickness of the sediment. Under the second standard they are areas with 1,000 to 3,000 feet of sediment cover over the Pre-Cambrian rock. Those areas with very low occurrence potential are primarily:

- Precambrian outcrops,
- Highly metamorphosed areas that are not proven overthrusts with a section of sediments likely below the thrust sheets, or
- Large areas of outcrop of younger intrusive rocks (i.e., the Boulder Batholith, between Helena and Butte).

Reasonably Foreseeable Development

At the time the 1984 Headwaters RMP was prepared, little additional leasing was anticipated to take place because most available leases had already been acquired under existing established leasing regulations with appropriate stipulations for special conditions. It was also anticipated that a relatively large number of permits to drill might be sought, given the accelerated level of exploration activity that was being driven by economic conditions at the time and relatively new discovery of prospects for deep structurally trapped oil in the Montana Overthrust Belt. Laws, regulations, and rules were in-place to provide guidance with these leasing and permitting activities. It was anticipated that oil and gas drilling would be a part of the foreseeable future of resource development within the PA.

Despite the flurry of exploration activity in the Montana Overthrust Belt in 1983, the only two areas of oil and gas production were in Teton and Pondera Counties, east of the Rocky Mountain Front in areas are no longer within the PA.

The Reasonably Foreseeable Development (RFD) scenario is an estimate of oil and gas activity expected because of resumed oil and gas leasing in the PA. The scenario is hypothetical in that drilling may occur anywhere in the PA where an oil and gas lease allowing surface occupancy is issued. Actual drilling proposals

that result from leasing, if any, will likely differ in location from those anticipated by this RFD scenario. It is also possible that leasing could result in either more or fewer drilling proposals than presented in the scenario. A summary of the RFD scenario prepared for this RMP follows.

Four areas were identified during preparation of the RFD scenario as having the highest potential for conventional oil and gas exploration and drilling activity in the Planning Area. Each of the four areas is associated with one or more play areas defined by the USGS. These areas are further described and also mapped in **Appendix M** of this document. Area #1 is referred to as the “Southern Deerlodge Valley Basin Area”. This area occurs in the southernmost portion of a fault bounded Tertiary-aged basin that is located in the Deerlodge Valley. Area #2 is referred to as the “Imbricate Thrust Zone”. The area occurs both to the north and east of Helena, Montana, in a sequence of sediments that are thick and structurally thickened by imbricate thrust faulting associated with the Eldorado and Reff thrust faults. Area #3 is referred to as the “Helena Salient Gas Play Zone”. This zone occurs over a very large area in the east-central portion of the Planning Area. Area #4 consists of the “Crazy Mountain Oil and Gas Play.” This area occupies most of the northern portions of Gallatin and Park Counties in the easternmost portion of the Planning Area as a broad extensive area of potential oil and gas resources.

The Bill Barrett Corporation recently (May 2, 2007) initiated a four well drilling program in northern Park County within the Butte Field Office boundaries. The four locations are located in T. 4 N., R. 8 E. and T. 5 N., R. 8 E., None of the locations are located on Federal minerals. The first well in the program (the Draco #10-15, NW¼, SE¼, Sec. 15, T. 4N, R. 8E) to be spud in has reached total depth and it has apparently had production casing set (September 14, 2007, Rocky Mountain Oil Journal). The Press has announced that it will be tested in the fall of 2007. The second well is being drilled as this is written (October, 2007). For purposes of this RMP it is assumed by the BLM that two of the wells in this drilling program will be producing wells and that these two wells would each have two producing development wells drilled, one of which would be a federal well. The BLM has also assumed that these would be gas wells. This area has not been identified as an additional analysis area in **Appendix M** as the areas identified there are areas of forecast exploration activity. This area is an actual prospect that is being drilled. The BLM does not have detailed information on the prospect and does not wish to guess on its size and surface dimensions.

Based on the analysis in the RFD scenario, it was estimated that up to 19 conventional oil and gas wildcat wells (exploratory wells drilled in an area with no existing production) might be drilled in the PA in the next 15

to 20 years. Of these 19 wells, it is estimated that 13 would be "dry" holes. Dry holes would be plugged and abandoned with surface reclamation occurring shortly afterward. It is further estimated that six of the wells could be completed for production. Each of the discovery wells would probably prompt additional step-out wells. A "step-out well" is a well drilled adjacent to or near a proven well to establish the limits and continuity of the oil or gas reservoir or to assist with production. It was estimated that 12 step-out wells would be drilled, two for each discovery. For analysis purposes seven of the producing wildcat and step-out wells are assumed to be BLM.

Coal Bed Natural Gas

As the name suggests, coal bed natural gas resources are sources of natural gas that are intimately associated with coal deposits. The gas is generated by degradation of buried organic material as a byproduct of its conversion to coal by either thermal (burial) or microbial activity. Often the coal deposit is saturated with water; and the gas generated is typically trapped under pressure by groundwater within the coal beds. Drilling and relieving the water pressure allows the gas to be released from the coal bed aquifer.

There are very few significant coal deposits within the PA and therefore little potential for exploration or development of coal bed natural gas resources outside of the Trail Creek and Livingston coal-fields. In 2001, J. M. Huber Corporation applied for a permit to drill one coal bed natural gas well in the southeastern part of the PA, on private land. This proposed well would have targeted potential gas reserves possibly associated with the Trail Creek coal-field, near Bozeman Pass, east of Bozeman. These coal-fields are not located on BLM administered public land; however, the BLM does administer a small number of isolated tracts of split estate minerals in the Trail Creek coal deposit area. This permit to drill was granted by the State of Montana, but legal action involving Gallatin County and the formation of a local zoning district delayed drilling of the well. The permit to drill expired in January of 2003. This area is referred to as Area #5 in the RFD. This is an area on Bozeman Pass where an area of coal bed natural gas potential is associated with the coal deposit on the Pass.

It is anticipated that as many as 40 wells would be drilled for coal bed natural gas in limited and scattered areas of known sub-bituminous coal resources located in Gallatin and Park Counties; most likely in the Trail Creek Road area near Bozeman Pass (Livingston and Trail Creek Fields). It is envisioned that initially 16 exploration wells would be drilled, and that six of these would discover coal bed natural gas resources that would warrant the drilling of an additional 24 step-out wells to develop the resources. These would all likely be non-federal wells based on the small percentage of federal ownership in the area.

Geothermal Resources

Geothermal resources are naturally occurring heat sources that can potentially be used for heat or generating power. The structural geologic setting of the PA is ideal for development of geothermal resources. In addition, there is an extensive naturally occurring geothermal system developed around the Yellowstone volcanic center.

Geothermal resources are rated by temperature:

- Low temperature, less than 194° F;
- Moderate temperature, 194-302° F; and
- High temperature, greater than 302°F.

No high temperature geothermal resources have been identified in Montana. Although there are many known geothermal springs in the PA, only a small number of them have been developed commercially (for example, Chico Hot Springs, Bozeman Hot Springs, Fairmont Hot Springs, Broadwater Athletic Club, etc.), and none of those are on public land.

There are three Known Geothermal Resource Areas (KGRAs) on public land within the PA; Boulder Hot Springs, Corwin Springs, and Marysville.

The Boulder Hot Springs is a large KGRA located near Boulder, in Jefferson County. Temperatures are variable and low, and the resource is probably only useful for recreation, heating for buildings, or possibly agricultural use. Most of the outlying springs are only useful for recreational or small space heating.

The Corwin Springs KGRA is located along Highway 191 about seven miles northwest of Gardiner, in Park County, along the Yellowstone River near Yellowstone Park. Some interest was expressed in developing this geothermal resource for heating purposes in the early 1990s on private land. The proposal was somewhat controversial at the time, and in January 1994 a Water Rights Compact between the NPS and the State of Montana placed limits on the development of all water resources (and geothermal resources in particular), adjacent to Yellowstone Park in Montana (similar actions were taken in Idaho). The purpose of this controlled groundwater area is to protect the geothermal resources at Yellowstone National Park. This federally managed hot springs has not been offered for a lease sale.

The Marysville KGRA is located about 12 miles northwest of Helena, Montana. This geothermal resource was identified by anomalous geothermal heat flow and does not have any surface expression of a hot spring. Temperatures are moderate (around 100°C (212°F) and no useable resource was developed (1983). In 1997 a geothermal lease application was filed as a non-competitive offer and included land within the Marysville KGRA. Because it was a non-competitive lease offer within a designated KGRA, the BLM rejected the offer. After an appeal the lease offer was withdrawn.

The Boulder and Marysville KGRAs have been offered for lease sale in the past but have not had any bidders. There has been no recent interest in leasing any of the three areas.

Leasable Solid Minerals

Coal

In the southern part of the PA, the small Trail Creek, Livingston, and Electric (Gardiner) coal-fields, although historically mined, are still undeveloped. Historical underground production was small; production began in about 1870 and was completed by 1947, reaching a peak in about 1910. Although some production was used for heating purposes, most production was used in metal smelters and steam engine locomotives. Much of the coal was converted to coke for use in the smelters in hundreds of small coking ovens (Alt and Hyndman 1986). It is likely that significant underground reserves of coal remain in the area, but given the small size of the fields, their location with respect to recent rural residential development, and the fact that the coal needs to be mined from underground makes future development unlikely. Other sporadic undeveloped and sub-economic deposits of coal and lignite occur throughout the PA.

Phosphate

Extensive deposits of the Permian Phosphoria Formation have been historically mined from the Maiden Rock area south of Butte. Mining for phosphate here probably peaked in the early 1950s when the phosphate was used to supply an elemental phosphate plant at Silver Bow, west of Butte. These mines were underground mines and resulted in significant underground development. Activity here ceased in the 1970s. There are phosphate resources remaining both at the Maidenrock area and south and to the east, north of the Humbug Spires, but the development of the phosphate fields in Idaho, where the mines could be developed as open cut mines, has rendered these resources as uneconomic.

Locatable Minerals

Metals

Mineral deposits of gold, silver, copper, lead, zinc, and molybdenum are present within the PA (AMS Figure 2-3). Because of the unusually abundant mineral wealth in the Butte Field Office, this area contains some of the most famous mining districts in Montana, including: Butte, Corbin-Wickes, Basin, Scratch Gravel Hills, Marysville, Radersburg, Helena, Elkhorn, Boulder, Emigrant, Jardine, and New World.

Active metal mines in the PA include:

1. The Golden Sunlight Mine, an open pit gold mine northeast of Whitehall opened in 1981. The mine has operated continuously since then and is scheduled to close in approximately 2010;

2. Montana Tunnels Mine, an open pit polymetallic mine (lead, zinc, silver, gold) located west of Jefferson City opened in 1985 and is scheduled to close in 2011; and
3. Montana Resources Mine (the Butte mine), an open pit copper and molybdenum mine with associated silver and gold byproducts. Mines in the Butte area have operated more or less continually since the 1860s and this is the current pit, following on from previous open pits in the district, the Berkeley Pit and the Continental Pit. The mine has reserves that extend many years.

Limestone

Three active limestone mines are located within the PA. These mines process high-calcium limestone for chemical and industrial uses.

The Indian Creek Mine is on public land adjacent to and within the Montana Army National Guard's Limestone Hill Training Area, west of Townsend, in Broadwater County. A proposal by the Montana Army National Guard to withdraw the area from the public land laws, including the mining law, is currently in progress. A Legislative EIS has been prepared for Congress, which ultimately determines whether, and under what conditions, the withdrawal is granted. Under the Preferred Alternative the Montana National Guard would manage all resource uses except minerals, which would continue to be managed by the BLM. The Ash Grove Cement Company produces limestone from its Montana City Quarry. The Trident Mine, another limestone mine, is north of Three Forks, in Gallatin County.

Marble and Slate

A small marble quarry has been operated intermittently at the south end of the Limestone Hills area and west of Townsend. Marble from this quarry has been shipped internationally for use as pedestal and column bases.

Two slate building stone quarries are located in the PA. One is in Soap Gulch area near Melrose (south of Butte) and the other quarry, the Gates Stone Quarry, is located in Towhead Gulch. Another series of small open-cut mines or quarries in the Gardiner area have mined travertine for decorative building or ornamental uses. Operation of these quarries has been intermittent and they often reopen and operate to meet a specific demand.

Salable Minerals

The PA currently has three salable material operations on public land. Two sand and gravel pits are located in the Limestone Hills west of Townsend. One of the pits is inactive and the other pit is used by the Army National Guard for road surfacing material. The third, a community flagstone pit, is located near Montana City.

RECREATION

Recreation Opportunities

Recreational activities available within the Decision Area include big game hunting, upland bird and waterfowl hunting, fishing, mountain and road biking, camping, backpacking, horsepacking, river rafting, canoeing and kayaking, swimming, lake boating, downhill skiing and snowmobiling, OHV use, picnicking, archery, organic materials gathering, organized festivals, and viewing wildlife and landscapes. No Recreation Opportunity Setting classifications currently exist to guide appropriate levels of recreation experiences, services, and developments.

BLM land along the Madison, Big Hole, Jefferson, Missouri, and Yellowstone rivers, offer some of the most outstanding sport fishing opportunities in the United States. The State of Montana classifies many reaches of these streams as Class I or "blue ribbon" fisheries. In addition the Butte Field Office manages intensively used land and highly developed sites along Holter, Hauser, and Toston Reservoirs on the Missouri River.

Recreation Management Areas

Specific recreational resources in the Decision Area include five Special Recreation Management Areas, one Extensive Recreation Management Area (ERMA), and 49 developed recreation sites, seven of which are fee sites (**AMS Figures 2-24a, 2-24b, and 2-24c**). Fee collections at developed sites are used to maintain, operate, and improve facilities and services. An SRMA is an area where BLM prioritizes management efforts to provide specific recreational activities and opportunities (**AMS Figure 2-25**). These areas usually require higher levels of recreational management. An ERMA is an area not specifically designated as an SRMA and includes all BLM land outside the SRMAs where uses are generally dispersed and management primarily custodial. This extensive area includes the Continental Divide Trail, three popular OHV riding areas, and several developed recreation sites where both dispersed and concentrated

recreation activities occur. The primary objectives for managing the ERMA are resource protection, public safety, and user satisfaction. Within this extensive area, public services, monitoring, improvements, and facility maintenance are conducted at a lower scale. Information on visitor usage of SRMAs and the ERMA is provided in **Table 3-22**.

Holter Lake/Sleeping Giant SRMA

The Holter Lake/Sleeping Giant Special Recreation Management Area totals 19,000 acres and is located on both sides of Holter Lake about 30 miles north of Helena. The SRMA includes a portion of the Lewis and Clark National Trail, the Sleeping Giant ACEC, the Sleeping Giant and Sheep Creek Wilderness Study Areas, seven developed recreation sites and about 30 dispersed boat-in camp sites. Both of the Wilderness Study Areas are recommended for wilderness designation and are currently closed to motorized uses. Four of the seven developed recreation sites are fee sites:

- Beartooth Landing.
- Woodsiding Trailhead.
- Sleeping Giant Trailhead.
- Departure Point: Fees – Camping \$10, Day Use \$2, Season Day Use Pass \$25.
- Holter Lake Dam: Fees – Camping \$6.
- Holter Lake Recreation Site: Fees – Camping \$10, Day Use \$2, Season Day Use Pass \$25, Group Picnic Reservations \$50.
- Log Gulch Recreation Site: Fees – Camping \$10, Day Use \$2, Season Day Use Pass \$25, Group Picnic and Camping Reservations \$50.

This SRMA is a high use area especially along Lake Holter. Primary recreation opportunities in this SRMA include camping, picnicking, boating, fishing, swimming, hiking, hunting, and viewing wildlife, spectacular landscapes, which feature Beartooth Mountain and the Gates of the Mountains Canyon.

Table 3-22				
2005 Decision Area Visits and Visitor Use Days by Recreation Management Area				
RMA	Visits	VUD¹	% of Total Visits	% Total of VUDs
Headwaters ERMA	644,100	507,048	52%	44%
Holter Lake/Sleeping Giant SRMA	159,250	253,396	13%	22%
Humbug Spires SRMA	19,000	24,146	2%	2%
Lewis and Clark Trail SRMA	277,600	254,884	22%	22%
Scratch Gravel Hills SRMA	13,950	4,609	1%	0%
Upper Big Hole SRMA	133,200	113,916	11%	10%
Totals	1,247,100	1,158,000	100%	100%

¹ One VUD = 12 hours.

Source: USDI-BLM 2005c

Lewis and Clark Trail SRMA

The Lewis and Clark Trail Special Recreation Management Area totals about 16,300 acres of BLM land. It is a corridor that encompasses the lower reaches of the three rivers forming the Headwaters of the Missouri River (Jefferson, Gallatin, Madison) and the uppermost segment of the Missouri to Hauser Lake Dam. Missouri River reservoirs within this SRMA include Toston, Canyon Ferry, and Hauser Lakes. This SRMA includes the Lewis and Clark Historic Trail, two recently acquired areas (Ward and McMaster Ranches), 15 developed recreation sites, and numerous dispersed use sites along the lakes and river shorelines. Two of the 15 developed recreation sites are established fee sites.

- Clark's Bay Day Use Site: Fees – Day Use \$2, Season Day Use Pass \$25 and Group Picnicking Reservations \$50.
- Devil's Elbow Recreation Site: Fees – Camping \$10, Day Use \$2, Season Day Use Pass \$25 and Group Camping Reservations \$50.
- Two Camps Vista.
- Spokane Bay.
- French Bar.
- White Sandy Recreation Site: Fees – Camping-\$10.00 and Group Camping Reservations-\$50.00.
- Ward Ranch Historical Site.
- Spokane Bay Trailhead.
- McMaster Hills West Trailhead.
- McMaster Hills East Trailhead.
- Spokane Hills South Trailhead.
- Lombard Recreation Site.
- Crimson Bluff.
- Lower Toston Recreation Site.
- Toston Dam Recreation Site.

The Lewis and Clark Trail SRMA is located between Helena, Bozeman, and Whitehall. Primary recreation opportunities include camping, power boating, river floating, fishing, swimming, horseback riding, hiking, hunting, and viewing wildlife/scenic landscapes.

Scratchgravel SRMA

The Scratchgravel Hills Special Recreation Management Area totals about 5,500 acres and is located immediately northwest of Helena. The area provides numerous day-use recreation opportunities. Residents of Helena and subdivisions around the Scratchgravel Hills area are the primary users of the community-based SRMA. This area includes numerous secondary roads and trails and three developed recreation sites none of which have fees:

- Head Lane Trailhead.
- Tumbleweed Trailhead.
- John G. Mine Trailhead.

Primary recreation opportunities provided by the Scratchgravel Hills SRMA include hiking, jogging, horseback riding, OHV riding, mountain biking, foling, and limited fall hunting. Conflicts between motorized and non-motorized users are occurring. This area is currently closed to shooting outside the fall hunting season, open fires and fireworks. A cooperation management agreement exists with Lewis and Clark County to provide support services in the area.

Humbug Spires SRMA

The Humbug Spires SRMA totals about 11,000 acres and is located about 26 miles south of Butte along Interstate 15. A portion of this area was designated a BLM Primitive Area in 1972. Approximately 8,800 acres of the Humbug Spires Wilderness Study Area is recommended for wilderness designation. This SRMA is characterized by irregular drainages and hills that are forested with Douglas-fir and lodgepole pine. Special features include the numerous granite rock spires (nine rise 300 to 600 feet), Moose Creek, numerous riparian areas, old growth timber, and lush meadows. This SRMA contains one site, the Moose Creek Trailhead, which provides important access to an established hiking trail.

The Humbug Spires SRMA area offers many quality opportunities for primitive and unconfined recreation. Primary activities include hiking, tent camping, backpacking, stream fishing, horseback riding, rock climbing, fall hunting, wildlife viewing, nature photography, and snowshoeing. The SRMA is closed to motorized vehicle use.

Upper Big Hole River SRMA

The Upper Big Hole River Special Recreation Management Area totals about 15,000 acres of BLM land. The area is located west of Interstate-15 and Divide, along the Upper Big Hole River in Silver Bow, Beaverhead, and Deer Lodge counties. This SRMA includes numerous access roads, trails, 11 developed recreation sites, and numerous dispersed use locations along the river. One of the 11 developed recreation sites has an established fee.

- Divide Bridge Campground: Fee – Camping \$6.
- Sawmill Gulch Trailhead.
- Divide Bridge Day Use Area.
- Jerry Creek Bridge.
- Dickie Bridge Recreation Site
- Bryant Creek Recreation Site.
- East Bank Recreation Site.
- Sawlog Gulch.
- Pintlar Creek.
- Maiden Rock East.

The Big Hole River offers some of the most outstanding sport fishing opportunities in the United States, especially during the famous salmon fly hatch season. The State of Montana has classified this river as a Class I or "blue ribbon" fishery. Other opportunities in the area include camping, picnicking, river floating, hunting, hiking, driving for pleasure and nature observation, which are all focused within the river corridor.

Headwaters ERMA

The Headwaters Extensive Recreation Management Area includes all BLM land not identified as an SRMA. This public land totals about 238,000 acres. Primary recreation site/areas include three OHV riding areas, three popular rock climbing areas, hiking trails, trailheads, river access sites, campgrounds and numerous dispersed use areas.

There are 12 developed recreation sites within this ERMA none of which have established fees, including:

- Carbella Recreation Site.
- Buffalo Hump Recreation Site.
- Crow Creek Recreation Site.
- Duck Creek Recreation Site.
- Galena Recreation Site.
- Radersburg OHV Site and Trailhead.
- Ohio Gulch OHV Site and Trailhead.
- Sheep Mountain Trailhead.
- Pipestone OHV Trailhead.
- Four Corners OHV Trailhead.
- Whiskey Gulch OHV Trailhead.
- Sheep Camp Recreation Site.
- Ringing Rocks Recreation Site.

Recreation Use

In 2003, 65 percent of visitors' time was spent engaging in recreation activities outside of developed recreation sites (USDI-BLM 2004c). In 2003, the ten most popular uses in the Decision Area included: camping; driving for pleasure, fishing, hiking, running, walking, big game hunting, OHV use, picnicking, power boating, swimming, and wildlife viewing (USDI-BLM 2003d). Camping and freshwater fishing had the most visitors and Visitor User Days (VUD) out of the top ten recreation activities in the Decision Area (USDI-BLM 2003d) (**Table 3-23**).

Table 3-23
2005 Decision Area Visits and Visitor Use Days by Primary Recreation Activities

Recreation Activity	Visits	Percentage of Total	Total Visitor Days	Percentage of Total	Concentrated Visitor Days	Dispersed Visitor Days
Fishing	166,100	13%	113,000	10%	83,000	30,000
Motorized Water Activity	159,300	13%	58,000	5%	38,000	20,000
Motorized Vehicle Travel	153,700	12%	115,000	10%	15,000	100,000
Hunting/Archery	151,500	12%	170,000	15%	0	170,000
Camping	147,600	12%	427,000	37%	337,000	90,000
Wildlife/Natural Viewing	146,800	12%	57,000	5%	17,000	40,000
Foot Travel	124,700	10%	99,000	9%	30,000	69,000
Picnicking	73,800	6%	26,000	2%	20,000	6,000
Non-motorized Boating	36,400	3%	27,000	2%	8,000	19,000
Swimming	24,900	2%	18,000	2%	14,000	4,000
Snow Skiing	18,900	2%	21,000	2%	21,000	0
Snowmobiling	18,500	1%	10,000	1%	0	10,000
Biking	12,500	1%	2,000	0%	0	2,000
Rock Climbing	6,300	1%	9,000	1%	0	9,000
Horseback Riding	6,100	0%	6,000	1%	0	6,000
Totals*	1,247,100	100%	1,158,000	100%	583,000	575,000

¹ One VUD = 12 hours

Source: USDI-BLM 2005c

Special Recreation Use Permits

The Butte Field Office manages about 25 Special Recreation Use Permits each year. The primary activity for 14 of these permits is big game hunting. Most hunting outfitter/guides pursue mule deer, elk, upland birds, bear, and mountain lions. The Special Recreation Use Permits for hunting are for day use only. No hunting camps exist within the Decision Area. Special Recreation Use Permits are also issued for rock climbing in the Humbug Spires, Indian Creek, and Allen Spur. Recreation use permits are also frequently issued for folging, horseback riding, OHV group riding events, mountain biking events and other social gatherings.

All existing permits have been issued on a first-come, first-served basis. The authorized term for most existing permits is five years although policy allows for extensions up to 10 years when appropriate. Fee collecting for these special use permits are used to offset administrative costs, monitor approved activities and protect recreation resource values for future use.

Recreation Facilities

BLM has developed recreation sites on Hauser Lake and Holter Lake through donations under Federal Energy Regulatory Commission licensing agreements and exchanges with the State of Montana. Developed sites include Devil's Elbow Campground and the Clark's Bay Day Use Site on Hauser Lake, and Log Gulch Campground and Departure Point on Holter Lake.

Most dispersed developed recreation sites in the Decision Area contain picnic tables, vault toilets, improved boat launching ramps, and some parking areas. The Butte Field Office road system provides access to various trailheads throughout the area. Many of these sites have been acquired by BLM through exchanges and donations from the state and counties.

Recreation facility information collected from the developed-site inventory of Butte Field Office Facility Asset Management System (FAMS) database is summarized in Table 3-24.

Type of Site	Number of Sites	BLM Prior to 1984	Developed or Acquired Since 1984
Campground	17	3	14
Day Use Site	8	3	5
River/Reservoir Access	4	1	3
Trailhead	17	0	17
Interpretative	3	1	2
Total	49	8	41

TRAVEL MANAGEMENT, ACCESS AND FACILITIES

This section describes transportation facilities and their maintenance as well as other types of facilities administered by the BLM. Travel route availability decisions (open, closed or limited) are determined through site-specific Travel Management Plans. Most of the larger tracts of public lands have legal public access via existing federal, state, and county roads (AMS Figures 2-23a, 2-23b, and 2-23c). Many smaller tracts of public lands do not have legal access. In most cases, such parcels do not have resource values/demands that justify the costs for acquiring access. There are some situations where road segments to and within these parcels are important for a given resource use or to provide through access to other lands and are therefore included in the transportation plan.

Roads

The transportation road and trail system provides physical access for the public to state, private, and other federal lands throughout the Decision Area. Demands for the existing transportation network are directly related to the resources and uses within the PA. A transportation system is needed to maintain access for commercial activities (e.g. livestock grazing, timber harvest, mineral development, outfitting and guiding), non-commercial activities and casual use (e.g., OHV use, hunting, fishing, rafting, camping, bird watching, recreational driving, firewood gathering), and for administrative access to manage/protect resources and property.

The Decision Area has approximately, 856 miles of BLM system roads or trails with 510 miles recorded in FAMS. These roads and trails are within eight different counties and accessible via federal, state and county roads (Table 3-25).

County	Miles
Beaverhead	50.4
Broadwater	201.2
Deer Lodge	12.2
Gallatin	0.8
Jefferson	261.4
Lewis and Clark	219.3
Park	4.2
Silver Bow	106.8
Total	856.3

Source: Facility Asset Management System (FAMS) Road Inventory (Appendix L of AMS).

The primary federal roads within the PA include Interstate-15, US-89, US-191, and US-287 Interstate-90 and US-12. Almost all of the BLM roads are single lane consisting of natural, compacted soils. A few high usage roads (maintenance level 4 and 5) are double lane with improved aggregate surfaces. There are also approximately 3 miles of paved, bituminous base roads associated with recreation sites. On average, approximately 80 miles of BLM roads are maintained annually by BLM crews. While the maintenance levels are identified for roads, funding often does not allow BLM to meet the maintenance provisions of the assigned levels.

Gates and cattle guards on the road system are constructed and maintained using available funds from multiple programs. These facilities are monitored and maintained as part of the Transportation and Facilities program.

Trails

The Butte Field Office maintains approximately 80 miles of motorized and non-motorized trails. The condition of these trails is periodically assessed and recorded under the BLM FAMS system. Maintenance is performed as capabilities allow through the recreation and facility maintenance programs. State trail grants and BLM Challenge Cost Share funds are critical sources of revenue for maintenance. Funding often does not allow BLM to fully meet maintenance level provisions.

Administrative Sites

The Butte Field Office has two Administrative Sites: Belmont and Bull Mountain Communication Sites. Radio communication service calls are done by BLM personnel from the Montana State Office. Department of the Interior requires these structures have a Periodic Review of each asset performed at a minimum of every three years, and a Comprehensive Condition Assessment performed a minimum of once every five years. Maintenance is performed on these two sites on an “as needed” basis.

Recreation Sites

The Butte Field Office is a high use recreation area, with 49 developed recreation sites. Types and usage is covered under Recreation Use. Tracking of maintenance is done through the FAMS database with a work order process in the development stage. The Department of the Interior requires these facilities have a Periodic Review of each asset performed at a minimum of every three years, and a Comprehensive Condition Assessment performed a minimum of once every five years. Maintenance is performed on these sites annually. BLM has a five year plan, which allows for funding on deferred maintenance and capital improvement assets. This competitive, BLM-wide funding addresses high cost backlog maintenance needs. An example of the use of this fund-

ing is the replacement of approximately 35 vault toilets with concrete, handicap accessible restrooms.

Bridges

The Butte Field Office currently manages three bridges that are all associated with OHV trails in the Pipestone area. Condition assessments are conducted every two years; major culverts are assessed on a 10 year cycle. These facility assets are recorded and tracked through the FAMS database. Maintenance of these bridges will continue to be performed on an “as needed” basis.

Signs

The Butte Field Office currently maintains hundreds of signs throughout the Decision Area. Most of these signs are associated with roads, recreation sites, and OHV riding areas. Sign categories are Regulatory, Directional, Traffic Control, Informational, and Identification. All signs are monitored annually and maintained on an “as needed” basis. A GIS data system has been developed to locate and record all field office signs. Most new signs are ordered as needed on an annual basis through the BLM National Sign Shop in Rawlins, Wyoming.

Land Ownership

Most of the larger tracts of public land have legal public access via existing federal, state, and county road systems. Many smaller tracts of public land do not have legal access. In most cases, such parcels do not have resource values to justify public interest in acquiring access. Some small tracts along rivers serve as important public access points and require protection of existing legal access or acquisition of new legal access.

TRAVEL MANAGEMENT

Public expectations and demand for motorized and non-motorized recreation has changed substantially since the completion of the 1979 Dillon MFP and 1984 Headwaters RMP Plans. Advances in motorized and non-motorized recreation travel technology and use have increased the public’s ability to traverse conditions and terrains not previously envisioned. As a result, motorized travel has led to adverse resource impacts, as well as increased conflict between motorized and non-motorized users, particularly at urban/rural interfaces. Public interest and demand for motorized and non-motorized travel opportunities are expected to continue to increase.

Travel Management Plans

Areas within the Butte Field Office that have existing travel plans include:

- Elkhorn Mountains – “limited” area designation – (with the exception of an approximately 632 acre “open” OHV use area near Radersburg).
- Clancy-Unionville – “limited” area designation.

- Whitetail-Pipestone – “limited” area designation - (with the exception of an approximately 5 acre “open” motorized motorcycle hill climb area).
- Sleeping Giant – “limited” area designation.

These areas are described briefly below. Environmental documents for each of these previously completed site-specific travel plans are available at the Butte Field Office.

Elkhorn Mountains

The Elkhorn Mountains travel management area is located along the east side of Interstate I-15, between Boulder and Helena. The Elkhorn Mountains Travel Management Plan, established August 1995, is a cooperative project between the Helena and Deerlodge National Forests and the Bureau of Land Management. The Travel PAs consists of approximately 160,000 acres of National Forest lands and 68,205 acres administered by the Bureau of Land Management. The plan was developed in collaboration with the Montana Department of Fish, Wildlife and Parks because of high wildlife values and designation of the Forest Service portion of the Elkhorns as a Wildlife Management Unit. This plan represents a balance between motorized travel opportunities and protection of resource values. No management changes were necessary in order to comply with the 2003 Statewide OHV ROD.

Clancy-Unionville

The Clancy-Union Travel PA is located along the west side of I-15, approx. 3 miles northwest of Clancy, Montana, approximately 10 miles south of Helena. Clancy-Union consists of 5,820 acres. The Final Decision Notice for the Clancy-Unionville vegetation manipulation and travel management Environmental Impact Statement was signed February 2000. Although the travel management planning portion of the EIS analysis was developed jointly by the Forest Service (Helena National Forest) and the BLM, this (above referenced) Record of Decision is specific to only BLM actions. The selected alternative provides a system of designated roads and trails to ensure a wide variety of motorized and non-motorized recreation opportunities while protecting important resource values. No management changes were necessary in order to comply with the 2003 Statewide OHV ROD.

Whitetail-Pipestone

The Whitetail-Pipestone Travel PA is bounded by I-15 in the west, I-90 in the south, and Montana State Highway 399 in the East. Whitetail-Pipestone consists of 28,648 acres. In 1995, the Forest Service and Bureau of Land Management issued a Notice of Intent to prepare a joint EIS for Whitetail-Pipestone analysis area. In June 1998, the BLM issued an Emergency Closure Order restricting motorized use to existing roads and trails until a decision could be issued. In 2000, the Forest Service withdrew from the project due to budget reasons. The

BLM decided to proceed with an Environmental Assessment (smaller project area), and in March 2003 the travel plan for the BLM portion of this area was completed. The selected alternative provides a system of designated roads and trails to serve the needs of a wide variety of area users, while protecting important resources of the area (cultural, wildlife, vegetation, soil, and water). A plan amendment was initiated in concert concurrent with the travel plan EA. The plan amendment was approved August 2002, and converted a number of areas previously managed as Open to Restricted (Limited). No management changes in Whitetail-Pipestone were necessary in order to comply with the 2003 Statewide OHV ROD.

Sleeping Giant

The Sleeping Giant travel management area is located along the east side of Interstate I-15, approximately 30 miles north of Helena. It is bordered on the east by Hauser Lake and the Missouri River; and in the north by the small town of Wolf Creek. Totaling 18,300 acres, Sleeping Giant includes 11,609 acres of BLM lands managed as an ACEC, and 6,691 acres of BLM lands managed for multiple use. The ACEC contains two Wilderness Study Areas (Sleeping Giant, 6,666 acres; Sheep Creek WSA, 3,801 acres).

This travel plan was completed in March 2004. The plan protects the important resources of the area (WSAs, ACEC, wildlife, soils, vegetation, water quality, and cultural) while providing a designated system of roads to serve the needs of a variety of area users. No management changes were necessary in order to comply with the 2003 Statewide OHV ROD.

Other

Additional travel planning has been completed for several smaller “sub-planning” areas, including the Big Hole (Southwest Interagency Travel Management Plan), Confederate Gulch, Sawlog Creek, the Great Divide Ski area, and Nez Perce Ridge road. Several “emergency area closures” are in effect as well, pending future travel planning. The emergency area closures include the North Hills, Sawmill Gulch, Ward Ranch, the McMasters, and Spokane Hills.

In accordance with the 2003 OHV ROD and plan amendment, the Butte Field Office has identified and prioritized nine additional areas, all with “limited” area designations, needing site-specific travel planning. The nine proposed areas include:

- Helena (focus area – Scratchgravel Hills). High Priority
- East Helena (focus area – North Hills). High Priority
- Lewis and Clark County Northwest (focus area – Marysville). High Priority
- Boulder/Jefferson City. High Priority

- Upper Big Hole River. High Priority
- Missouri River Foothills. Moderate Priority
- Jefferson County Southeast. Moderate Priority
- Broadwater County South. Moderate Priority
- Park/Gallatin. Moderate Priority

The five high priority TPAs are described below.

Helena Travel Planning Area

The Helena TPA area contains 10,162 acres of BLM lands within the 95,492-acre TPA. The majority of lands in the TPA are privately owned (56,499 acres) with USFS lands making up a substantial portion as well (23,911 acres). The approximately 52.2 miles of BLM roads make up about 7.5 percent of the approximate total of 694 road miles in the entire TPA. Most roads (528 miles) are on private lands.

Two sub PAs, known as *Scratchgravel Hills* and *Birdseye*, are focal points for current traveling planning efforts. A number of small isolated tracts (overall total of 3,106 acres), are scattered throughout the remainder of the Travel PA. **Maps 6 through 9** depict the Helena TPA.

The Scratchgravel Hills area is 4 miles north of the Helena City limits, and contains approximately 5,403 BLM acres, in 18 sections. The Scratchgravel hills are characterized by gently rolling to moderately steep terrain varying in elevation from 3,700 to 5,200 feet above mean sea level. The Scratchgravel Hills have a dry climate. Average minimum/maximum temperatures are 8/29° Fahrenheit in January and 52/84° Fahrenheit in July. Average precipitation is approximately 12 inches. Average annual snowfall is 48 inches. Average number of days with snow on the ground is 61.

Seven soil series are represented in the Scratchgravel Hills. Most soils are highly erodible and several series are very shallow. Rock outcrops are prevalent in several mapping units. Existing vegetation at lower elevations include grasses, forbs, and scattered shrubs with patches of occasional juniper and ponderosa pine woodlands, with carpet-like areas of pine/fir colonization commonly occurring. Higher elevations and north facing slopes are dominated by ponderosa pine forest with a bunchgrass or fescue under-story that commonly contains stagnant, old Douglas-fir seedlings.

The Birdseye area lies 1.5 miles southwest of the Scratchgravel Hills, and contains approximately 2,655 BLM acres, in eight sections. The Birdseye area is similar in character, but the eastside rain shadow effect is much more pronounced with stubby limber pine and Douglas-fir trees dominating the open woodland areas. Ponderosa forest values are few, limited to north slopes bordering some of the deeper draws.

Scratchgravel Hills and Birdseye constitute islands of undeveloped hills surrounded by an area experiencing steady residential growth. According to the 1984 Scratchgravel Hills Comprehensive Management Plan, the Scratchgravel area contained 300 homesites in three major subdivisions and several smaller developments. Since that time, residential housing has continued to grow, with over 1,000 residential homes currently located in and around these same areas (U.S. Census Bureau 2000). Two additional residential developments, Big Silver Creek, and Cornerstone Village, are being planned. Big Silver Creek development will be located near the northwest corner of Scratchgravel Hills, adjacent to Big Silver Creek road. If approved, 82 residential units will be constructed on approximately 1,500 acres. The Cornerstone Village development will be located southeast of the Scratchgravel Hills, bordered by Franklin Mine Road on the north, and Head Lane on the west. If approved, Cornerstone Village will consist of over 800 single family dwellings located on 284 total acres of land. The development will also include a 300 person school occupying 30 acres.

As a result, the character of the area is rapidly changing from a rural setting to a residential neighborhood setting.

As the population and residential development of these areas continues, a significant increase in recreational and other uses of the Scratchgravel Hills and Birdseye areas is projected.

Existing Land Use

Recreation

Existing recreational use of the Scratchgravel Hills area is well established. There is an extensive network of roads and trails used by hikers, joggers, horseback riders, motorcyclists, OHV riders, and 4-wheel drive enthusiasts. Some “foling” and paintball game activity has occurred during the recent years. Hunting is considered marginal, big game numbers are low. Current management prohibits the use of fireworks and the discharge of firearms (except during hunting season).

Snow cover in the Scratchgravel Hills is generally inadequate for snowmobiling or cross country skiing. As a result, the area provides convenient winter time hiking, mountain bike, motorized travel and horseback recreation opportunities for local residents as well as those from the city of Helena.

As throughout the west, this combination of rapid urbanization and increased recreational use has led to sharp conflicts; between area residents, recreation users, and among recreational users themselves. The majority of conflict stems between non-motorized and motorized recreational use activity. As expressed during the public scoping meeting, many area residents deliberately located near Scratchgravel Hills in order to pursue recreational interests.

This TPA contains three developed recreation sites (Head Lane, John G. Mine, and Tumbleweed Trailheads) and one Special Recreation Management Area (Scratchgravel Hills). All remaining lands within the TPA are managed as part of the Butte FO Extensive Recreation Management Area. There are no existing and potential Special Designations within this TPA.

Mineral/Energy Development

The Scratchgravel Hills is an area which contains precious and base metals in both hard rock and placer deposits. Historic production came from numerous small mines throughout the area. Over the years there have been a large number of patented and unpatented mining claims distributed throughout the area. While presently only a few claims are maintained, increases in precious metal prices could increase the mineral activity level.

Range Management

Thirteen grazing allotments exist in the Helena TPA. The largest allotment is the Granite Creek allotment in the Birdseye area. Due to the extended drought conditions, the amount of active grazing use has declined in the last 4 to 5 years. Grazing use may increase if wetter climate conditions return.

Forest and Fire Management

There are approximately 3,100 acres of forest and woodland in the Helena TPA. The Scratchgravel Hills portion was withdrawn from general forest management in the Headwaters RMP during the last 20 years. The closed pine forest conditions and extensive colonization have left many areas with dense and hazardous fuels conditions. It is expected that the area would burn intensely with severe impacts similar to those seen to the east when the Spokane Hills near Canyon Ferry burned in 2000. The fuels in the area are classified in the moderate to high hazard range. In 2000/2003 a fuels hazard assessment was done for the Scratchgravel Hills area. Findings from that assessment show that in the forested areas, 52 percent of forested stands rated high; and 37 percent of forested stands rated moderate for hazardous fuels conditions in the Scratchgravel Hills Fire Management Zone. In consideration of the WUI (Wildland/Urban Interface) that surrounds the area, the Scratchgravel Hills are a high priority for fuels reduction work. Mechanical fuel reduction work has been conducted in the Silver Creek area within 500 feet of the public/private land boundaries over the last several years. More mechanical projects are anticipated to reduce the fuels and enhance the health of the forest ecosystems.

Cultural/Historic

Prehistoric sites in the Scratchgravel Hills are very sparse, even though they are relatively close to the Montana City Archeological District. They consist mainly of lithic scatters and may or may not be related to activity

in the archeological district. European sites in the Scratchgravel Hills are related to mining. Placer mining started in the Scratchgravel Hills earlier than in Last Chance Gulch, but was never very productive. Several lode mines were developed later, but the area never produced as well as the other districts in the Helena area.

Military Activity

The Montana State National Guard is known to use portions of the Birdseye area during training activities.

Important Resource Issues

Wildlife

The Helena TPA is heavily populated with subdivisions, ranches, and development, especially near the town of Helena. Although human development is extensive in the TPA, habitat is still available for those wildlife species that depend on grassland/shrublands and dry forests.

BLM lands in the TPA are dominated by grassland and shrubland habitats (6,501 acres) as well as dry Douglas fir and ponderosa pine forests (3,700 acres).

Grasslands and sagebrush habitats within the TPA provide habitat for elk, mule deer, pronghorn antelope, badger, coyote, red fox, mountain cottontail, whitetail jackrabbit, ground squirrels, and other small mammals.

Forests in the TPA provide habitat for species including but not limited to: elk, moose, mule deer, coyote, red fox, bobcat, cougar, black bear, mountain lion, mountain cottontail, marmot, red squirrel, and other small mammals.

The TPA also provides habitat for numerous forest and grassland bird species including but not limited to: pileated, hairy and downy woodpeckers, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, blue grouse, hairy and downy woodpeckers, dusky flycatcher, pine siskin, western tanager, black-capped chickadee, red-breasted nuthatch, mountain bluebird, Townsend's solitaire, dark-eyed junco, Cassin's finch, pine siskin, red crossbill, western meadowlark, Swainson's hawk, red-tailed hawk, horned lark, mountain bluebird, prairie falcon, chipping sparrow, savannah sparrow and vesper sparrow.

Critical fawning and foraging habitat for pronghorn antelope was historically located in the southwest section of Scratchgravel Hills. Year-round pronghorn habitat was also historically found in the northeast corner of the Helena TPA. Although portions of the area still provide pronghorn habitat, due to the extensive amount of development around Helena, the area no longer provides high quality pronghorn habitat.

A 50,000 acre strip through the middle of the Helena TPA continues to provide winter range for mule deer. The entire western half of the TPA, approximately 56,400 acres, is winter habitat for elk.

The Birdseye section of the Helena TPA is within a wildlife movement corridor that provides a connection between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem. This corridor also provides for local daily movements and seasonal movements between higher elevation summer range along the Continental Divide and lower elevation winter range. This corridor is predominately moderate quality due to fairly high road densities in the TPA (greater than 2 mi/mi²).

This TPA also provides habitat for several BLM sensitive species including; golden eagle, flammulated owl, Brewer's sparrow, long-billed curlew, ferruginous hawk, Swainson's hawk, and long-eared bat.

The long history of mining in the area has created habitat for bats and surveys have been conducted to determine bat use of the area. Eighteen abandoned mines were surveyed in 2002 and 2003 in the Scratchgravel Hills. Bat species identified during these surveys included: western small-footed myotis, long-legged myotis, hoary bat, big brown bat, and several unknown myotis species. As a result of surveys, five abandoned mines were closed with bat gates.

Aquatics/Fisheries

This 95,500 acre TPA is found within the Upper Missouri watershed. There are approximately 71 miles of perennial streams and 37 miles of fish bearing streams on all land ownerships in the TPA. Non-native fish species found in the TPA include brook, brown, and rainbow trout. Native fish found in the TPA include white sucker, longnose sucker, westslope cutthroat trout, and mottled sculpin.

On BLM lands, there are approximately 6.0 miles of perennial stream, 2.0 miles of fish bearing stream and 5.5 miles of intermittent stream. Fish species found in streams managed by the BLM include non-native brook trout and native westslope cutthroat trout.

In the entire TPA, there are five streams (Skelly Gulch, East Skelly Gulch, Threemile Creek, Greenhorn Creek, and Silver Creek) with westslope cutthroat trout (BLM sensitive species). Westslope cutthroat trout are found throughout approximately 20 miles of stream. Genetic testing has been completed on two streams (Threemile and Skelly Gulch) and has confirmed these fish to be 100 percent genetically pure.

In the Helena TPA, there are two streams on BLM lands (Skelly Gulch and Greenhorn Creek) where westslope cutthroat trout have been confirmed. Greenhorn Creek provides approximately 1 mile of habitat for westslope cutthroat trout and these fish have not had genetic testing to confirm their purity. Skelly Gulch also provides approximately 1.0 mile of habitat for westslope cutthroat trout and genetic testing has confirmed these fish to be 100 percent genetically pure.

Water Resources

Within the entire Helena TPA there are six streams (totaling about 37.9 stream miles) that are listed as impaired water bodies by Montana Department of Environmental Quality. Impaired reaches of two of these streams, Sevenmile Creek (0.1 mile), and Skelly Gulch (0.8 mile) flow through BLM managed lands. Siltation is identified as one of the impairment types for both of these streams.

Riparian

Approximately 7.8 miles of riparian reaches and associated habitat are found in the Helena travel planning area. Current condition ratings on these reaches include 3.7 miles in Proper Functioning Condition, 1.6 miles Functioning-At-Risk condition, and 1.7 miles in non-functioning condition. Trends on most reaches are upward or static.

Currently, the roads having the biggest impacts on riparian conditions in this TPA are the county road along Sevenmile Creek and the access road paralleling Skelly Gulch. Both roads deliver extra sediment to these streams as well as affecting creek banks.

Sensitive Plants

The overall TPA contains populations of two sensitive species, linearleaf fleabane, and lesser rushy milkvetch. Both species grow in the Scratchgravel Hills area. Linearleaf fleabane grows on dry, often rocky soil from the foothills up to moderate elevations, frequently with sagebrush. Lesser rushy milkvetch grows in grassland and shrublands often in association with bluebunch wheatgrass, fescue species, and mountain big sage. Noxious weed infestations pose the greatest threat to these species' long-term health and viability.

Noxious Weeds

The primary noxious weeds in the Helena TPA are leafy spurge, Dalmatian toadflax, whitetop, spotted knapweed, houndstongue, and Canada thistle.

In the Scratchgravel Hills area, leafy spurge is present throughout the area with the highest densities found in draws. Dalmatian toadflax infestations are spreading throughout the southern edge and located sporadically in other areas. Whitetop, spotted knapweed, houndstongue, and other undesired species are found in small, scattered infestations.

In the Birdseye area, leafy spurge, houndstongue, Canada thistle, and spotted knapweed are found in small to moderate infestations along roadways, drainages and some upland areas. Dalmatian toadflax, whitetop, and other invasive species like bull thistle and common mullein have been observed.

Soils

Seven soil series are represented in the Scratchgravel Hills. Many of the soils are highly erodable and several series are very shallow.

Minerals

The mineral potential of the Scratchgravel Hills is rated as high by the Montana Bureau of Mines and Geology. This high mineral potential in conjunction with the high number of mining claims in the area suggests the continuing potential for small scale mineral exploration and placer operations.

Summary Public Scoping Comments

Two public scoping meetings were conducted for the Helena TPA (December 1, 2004 and January 6, 2005). Both meetings were especially well attended by residents of the Scratchgravel Hills area. The majority of the written and oral comments received during the meetings centered on conflicts between motorized and non-motorized recreation users. Representatives of both user groups expressed a wide range of points of view, with discussions leading to the inevitability of the need for cooperation and resolution among conflicting uses. Some participants felt that although the Scratchgravel Hills area is not overly large, accommodations for both motorized and non-motorized uses could be made. Strategies included creating separate areas of use for motorized and non-motorized activities.

Other public issues and concerns included:

- Illegal activities - A number of comments were made during both meetings concerning a range of illegal activities, including dumping, drug use, underage alcohol use, unattended camp fires, and vandalism. There was widespread agreement that most of these activities were associated with motorized use, and oftentimes occurred after dark.
- General need for improved mapping/signing and trailhead facilities.
- Active enforcement of completed travel plan.
- Soil erosion.
- Noxious weeds.
- Wildland fire.

East Helena Travel Planning Area

The 200,991-acre East Helena TPA contains 20,039 acres of BLM lands. There are approximately 71 miles of BLM road, making up about 8 percent of the approximate total of 892 road miles in the TPA. The majority of roads (690 miles) lie on private lands.

The area lies in the Helena Valley, which has a dry climate. Average minimum/maximum temperatures are 8/29 degrees Fahrenheit in January and 52/84 degrees

Fahrenheit in July. Average precipitation is approximately 12 inches. Average annual snowfall is 49 inches.

Five sub-PAs, known as the North Hills, Mt. Bend, Ward Ranch/Centennial Gulch, McMasters Hills/Spokane Bay, and Spokane Hills/Breaks areas, are focal points for current traveling planning efforts. In addition, there are a number of smaller, isolated tracts scattered throughout the remainder of the East Helena TPA that may also require travel planning. Of the five, the North Hills has the most need for travel management, based on road density and current use levels. **Maps 10 through 13** present the East Helena TPA.

The North Hills area lies approximately three miles north of Lake Helena, and occupies 4,708 acres. The North Hills are bordered on the west, north, and south by private property, and by the Missouri River on the east. The majority of the North Hills are characterized by gently rolling to moderately steep terrain varying in elevation from 4,100 to 5,280 feet. The area along the Missouri River has a number of sheer, vertical rock cliffs that extend down to the river's edge. With the exception of several large open meadows, the lower elevations are vegetated with a moderately thick ponderosa pine forest; and occasional juniper and scattered shrubs. The higher elevations and north facing slopes are dominated by pine/fir forest with a bunchgrass or fescue under-story.

During the late summer of 1984, the northern half of North Hills was burned in a major wildfire. The fire resulted in severe impacts to many of the pine stands located on the north and east aspects of American Bar, Foster and a number of secondary drainages. Following the fire, emergency stabilization efforts (grass reseeding) were undertaken to reduce sedimentation into Holter Lake. Due to the lack of natural forest seed sources, areas that have converted to grass and downed log habitats will likely remain deforested for decades.

Mt. Bend is located approximately 3 miles east of Lake Helena, on the west side of York Bridge. Approximately 1,106 acres in size, Mt. Bend is bordered by Hauser Lake on the north and east, and by private property on the west and south. Mt. Bend can be described as a steep hill, ascending in elevation from south to north, and then descending again in the north to the Hauser Lake shoreline. The south facing slopes are vegetated by grasses, scattered trees and shrubs, while the higher elevations and north facing slopes are dominated by pine/fir forest.

The Ward Ranch/Centennial Gulch area is located along the eastern shore of Hauser Lake. Approximately 4,361 acres in size, it is bordered by Hauser Lake on the west, USFS lands in the north and east, and private property and Bureau of Reclamation lands on the south. The area extends north for approximately 7 miles, from the Riverside Recreation Site to Soup Creek; and varies in width from one to two miles. The area is composed of a combination of pre-existing BLM lands and the newly ac-

quired 2,200 acre Ward Ranch. The physical environment is similar in nature to the North Hills and Mt. Bend areas, and is characterized by gently rolling to moderately steep terrain varying in elevation from approximately 3,600 feet along Hauser Lake to 4,750 feet near the York Bridge area. The topography along the Missouri River varies from gently sloping foothills hills and valley meadows, to steep rock cliffs. With the exception of several large open meadows (and some cleared ranch lands), the lower elevations are vegetated with a moderately thick ponderosa pine forest; and occasional juniper and scattered shrubs. Higher elevations and north facing slopes are dominated by pine/fir forest with a bunchgrass or fescue under-story.

The McMasters Hills/Spokane Bay area is located at the southern end of Hauser Lake, approximately 2.5 miles west northwest of Canyon Ferry Dam. Approximately 1,588 acres in size, the area is bordered on the north by a combination of BLM, private, and Bureau of Reclamation lands (which in turn is bordered by Hauser Lake); and by private property on the west, south, and east. The area is composed of a combination of pre-existing BLM lands and the newly acquired McMaster's (North) ranch complex. The terrain varies in elevation from 3,750 to 4,100 feet. The southern portion of the McMasters Hills/Spokane Bay area is characterized by open valley land, and is the site for the McMaster's ranch complex, located adjacent to Spokane Bay and Spokane Creek. The ranch complex includes several cultivated fields, developed ponds, corrals/fences, residential housing, and an assortment of ranch buildings. With the exception of the ranch complex, which has mature cottonwood trees growing along Spokane Creek, the lower elevations are vegetated with native grasses, cacti, and a few scattered juniper and pine trees. The northern portion of the McMasters Hills/Spokane Bay area is a mosaic of steep sided ridges rising 300 to 400 feet above the valley floor, with rolling benches. The upper elevations are vegetated with sagebrush, native grasses, small groups of ponderosa pines, and several formerly cultivated fields planted to crested wheatgrass.

The Spokane Hills/Breaks area is located along the western shore of Canyon Ferry Lake. Approximately 7,492 acres in size, the Spokane Hills/Breaks area is bounded on the north, west, and south by private property. The east boundary is bordered by Bureau of Reclamation lands, which in turn are bordered by Canyon Ferry Lake. The Spokane Hills/Breaks area is composed of 6,286 acres of BLM lands (including the newly acquired McMaster's "South" ranch complex) and 1,205 acres of Conservation Fund lands. The area extends north for approximate 9 miles, from the White Earth Recreation Site to the Lorelei Recreation Site, and varies in width from 0.5 to 1.5 miles. The area is characterized by steep sided ridges punctuated by drainages and gullies. The Spokane Hills burned in their entirety on both the public domain and McMasters properties in the major Bucksnot Wildfire of 2000. Approximately 60 to 80

percent of the forest stands burned intensely with few surviving trees for natural reforestation.

Each of the five areas could be described as an island of undeveloped land, surrounded by steady residential growth. This is particularly true for the North Hills focus area.

According to the 2000 U.S. Census, the North Hills had 121 homes, with an estimated population of 300 people living in and around the area.

Existing Land Use

Recreation

Recreational use is well established for all five sub- PAs. Recreational use activities include: camping, hunting, target practice, hiking, jogging, horseback riding, mountain bike riding, and a range of motorized use (motorcyclists, OHV riders, and 4-wheel drive enthusiasts). Snow cover is generally inadequate for snowmobiling or cross country skiing. As a result, the sub-PAs provide convenient recreation opportunities for adjacent residents, as well as those from the city of Helena. Road density is relatively low for all five areas.

Three (travel related) emergency closures are in effect for the East Helena TPA, pending future resource and travel planning efforts. In 1991, in cooperation with the MFWP's "Block Hunting Management Program" the BLM restricted motorized travel in the North Hills to "designated open routes from October 15 to December 1". The purpose of the emergency closure was to minimize big-game harassment, soil erosion, vegetative loss, visitor safety hazards, and the spread of noxious weeds.

In 2004, an emergency closure was issued for the McMasters Hills/Spokane Bay sub-PA. With the exception of motorized access to the McMaster family residence/ranch complex, the closure prohibits all motor vehicle use from the former ranch lands. The purpose of the closure is to protect public health and safety, prevent the spread of noxious weeds, and protect cultural and historic values until a resource inventory is completed and public uses can be evaluated through resource management planning.

A 2004 emergency closure was also issued for the former Ward Ranch (Ward Ranch/Centennial Gulch sub-PA). Under the land transfer agreement, the former owner's will continue to reside at the ranch complex. The emergency closure restricts motorized public access from the ranch complex; non-motorized public access (hiking, horseback) is allowed. In addition, it provides an area shooting restriction for the protection and safety of the residents.

This TPA contains 11 developed recreation sites (White Sandy, Devil's Elbow, Two Camps Vista, Clark's Bay, Ward Ranch, Spokane Bay, French Bar, Spokane Bay TH, McMaster Hills W. TH, McMaster Hills E. TH, Spokane Hills S. TH) and one Special Recreation Man-

agement Area (Lewis & Clark National Historic Trail). All remaining lands within the TPA are managed as part of the Butte FO Extensive Recreation Management Area. Existing and potential Special Designation areas within this TPA include the Lewis & Clark NHT and the eligible Missouri River WSR segment below Hauser Dam.

Mineral/Energy Development

The East Helena TPA includes several historic mining districts; Missouri River, York, Magpie Gulch, Confederate Gulch, Hellgate, Winston, and Park (Indian Creek). Most of these mining district are renowned for their placer mines, including the “bars” of the Missouri River; Ming’s, American, El Dorado, Spokane, French, and Dana’s. These bars hosted rich deposits of placer gold and sapphires. Production records are incomplete, but likely total around \$15,000,000. Confederate Gulch was the richest producer. The placer gold was derived from lode deposits associated with intrusives in the Elkhorns and Big Belts. Production from lode deposits continued until 2002 when the Apollo Gold Diamond Hill Mine up Indian Creek closed. Mineral properties at Winston and Miller Mountain have had considerable exploration. Other mineral resources in the East Helena TPA include decorative building stone from the Greyson Shale Belt formation, a moderate potential for oil and gas development, and a low potential for stratibound copper deposits.

Active claims are common in the areas with high potential and there are active notices in the East Helena TPA as well.

Overall, there is low potential for leasable fluid mineral development throughout federal mineral estate lands in the Butte Field Office. However, in this context, the Reasonably Foreseeable Development Scenario for the Butte RMP identified approximately 13,492 acres of federal mineral estate lands in this TPA where oil and gas development potential is slightly higher (low to moderate) and may potentially occur.

Range Management

Ten grazing allotments exist in the East Helena TPA. The largest allotment is the Spokane Hills Individual allotment in the Spokane Hills/Breaks area. Due to the extended drought conditions and the 2000 Bucksnot fire, the amount of active grazing use has declined in the last four to five years. Grazing use may increase if wetter climate conditions return. BLM has cooperatively participated with private landowners, the State of Montana, the Bureau of Reclamation, and the Conservation Districts on a sheep and goat weed control project in the Spokane Hills/Breaks area the past three years.

Forest and Fire Management

Approximately 9,150 acres of inventoried forest land exist in the East Helena TPA, which does not include the McMasters properties scheduled for inventory prior to

implementation of forest management activities. Active forest management activities have been limited as a result of budget considerations in the 1980s and 1990s to small forest product sales based on public requests, wildfire salvage and replanting. No large timber sales, landscape vegetation treatments or fuel management projects have occurred, except on the McMasters properties in the Spokane Hills under private management where a number of clearcuts and selected harvest occurred in the 1970s while the property was privately owned. The McMasters’ areas fully regenerated after the extensive clearcutting, but the 2000 wildfire eliminated all the regenerating trees in those areas and the overstory trees that had provided seed for the natural regeneration were also killed in most areas. No public salvage or replanting occurred in the North Hills area after the 1984 fire, but approximately 220 acres of timber salvage and 250 acres of replanting occurred on public domain within 3 years of the Bucksnot Fire in the Spokane Hills, cumulatively amounting to 10 percent of the burned public domain. No forest management or further fire rehabilitation work is currently scheduled in the burn areas. The remaining forested areas are heavily stocked with second growth ponderosa pine and will be considered for both fuel reduction and forest health treatment work to deal with identified fuels and forest health problems.

In 2000/2003 a fuels hazard assessment was done for the North Hills Area. Findings from that assessment indicate that 66 percent of forested stands rated high and 13 percent rated moderate for hazardous fuels conditions in the North Hills Fire Management Zone. In consideration of the WUI (Wildland Urban Interface) that surrounds the area, the East Helena TPA is a high priority for fuels reductions work in the future.

Fire suppression for the East Helena TPA was delegated to the Forest Service as part of the offset of fire protection responsibilities in Montana.

Important Resource Issues

Wildlife

This TPA provides a diversity of habitats from agricultural fields to high elevation forests. BLM lands in the TPA, however, are dominated by dry forests of Douglas fir and ponderosa pine (10,702 acres) and grassland/sagebrush habitats (9,249 acres).

Forests in the TPA provide habitat for species including but not limited to: elk, moose, mule deer, coyote, red fox, bobcat, cougar, black bear, mountain lion, mountain cottontail, marmot, red squirrel, and other small mammals.

Grasslands and sagebrush within the TPA provide habitat for elk, mule deer, bighorn sheep, pronghorn antelope, badger, coyote, red fox, mountain cottontail, white-tail jackrabbit, ground squirrels, and other small mammals.

The TPA also provides habitat for a variety of forest and grassland bird species including but not limited to: pileated, hairy and downy woodpeckers, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, blue grouse, hairy and downy woodpeckers, dusky flycatcher, pine siskin, western tanager, black-capped chickadee, red-breasted nuthatch, mountain bluebird, Townsend's solitaire, dark-eyed junco, Cassin's finch, pine siskin, red crossbill, western meadowlark, Swainson's hawk, red-tailed hawk, horned lark, mountain bluebird, prairie falcon, chipping sparrow, savannah sparrow and vesper sparrow.

The majority of mule deer and elk winter range, approximately 42,000 acres, is located in the northern section of the East Helena TPA as well as along the shore of the reservoirs. The entire TPA is within pronghorn antelope habitat with approximately 20,000 acres of pronghorn winter range.

This TPA provides habitat for several BLM sensitive species including: golden eagle, flammulated owl, Brewer's sparrow, long-billed curlew, northern goshawk, ferruginous hawk, Swainson's hawk, and long-eared bat. The long history of mining in the area has created habitats for bats but surveys have not been conducted to assess use of these features. Habitat within the TPA also provides habitat for two BLM sensitive amphibians, the plains spadefoot, and the boreal toad. Several plains spadefoot toads were found in the late 1990s and 2001 in the southwest section of the East Helena TPA. Boreal toads were found near Canyon Ferry Lake.

The shorelines of upper Holter, Hauser, and Canyon Ferry Lakes provide good quality habitat for bald eagles, peregrine falcon, osprey, and numerous waterfowl.

Aquatics/Fisheries

This 201,000 acre TPA is found within the Upper Missouri watershed. There are approximately 171 miles of perennial streams and 100 miles of fish bearing streams on all land ownerships in the TPA. Fish species found in the TPA include non-native brook, brown and rainbow trout, walleye (Missouri River) as well as stocked Yellowstone cutthroat trout in Beaver Creek.

Native fish species found in the TPA include; white sucker, mountain whitefish, longnose dace, longnose sucker, stonecat, burbot, westslope cutthroat trout, and mottled sculpin.

On BLM lands, there are approximately 7.6 miles of perennial stream and an additional 1 mile of fish bearing stream.

In the entire TPA, there are approximately 14 miles of stream with westslope cutthroat trout. There are no streams on BLM lands in the TPA that provide habitat for westslope cutthroat trout in the East Helena TPA.

Spokane Creek (McMasters Hills/Spokane Bay area) is an important riparian area. The creek provides spawning habitat for brown trout, rainbow trout, and salmon in

Hauser Lake. Additionally, the associated riparian area provides habitat for several plant and animal species as well as acting as a filter for water flowing into Hauser Lake.

Water Resources

Within the entire East Helena TPA there are seven streams (including the Missouri River), totaling about 44.2 stream miles, that are listed as impaired water bodies by Montana Department of Environmental Quality. Impaired reaches of two of these streams, Trout Creek (0.3 miles), and Prickly Pear Creek (0.9 miles) flow through BLM managed lands.

Canyon Ferry Reservoir and the Missouri River from Canyon Ferry Dam to Hauser Lake are both identified as impaired water bodies on the MDEQ 303(d) list. Canyon Ferry Reservoir has impairments related to excess nitrogen and ammonia as well as excess algal growth, likely related to municipal point source discharges, septic systems, agriculture, and abandoned mine lands. Canyon Ferry also has excessive arsenic and thallium attributed to contamination from abandoned mine lands. Missouri River from Canyon Ferry Dam to Hauser Lake has impairments primarily related to excessive nutrients and oxygen deficiency. These impairments are attributed to dam construction, grazing in riparian or shoreline zones, municipal point source discharges, and septic systems.

Riparian

Approximately 22.3 miles of riparian reaches and associated habitat are found in the East Helena travel planning area. Current condition ratings on these reaches include 4.4 miles in Proper Functioning Condition and 17.9 miles in Functioning-At-Risk (FAR) condition. Most of the FAR reaches are associated with the lake/river shoreline of Hauser lake/Missouri River. Trends on most reaches are upward or static. Currently, BLM roads or trails are having minimal impacts on riparian conditions in this TPA.

Sensitive Plants

The North Hills and Spokane Hills areas have likely habitat for a sensitive species—lesser rushy milkvetch. Populations of this species have been found in both areas on private land.

Noxious Weeds

The primary noxious weeds in the East Helena TPA are leafy spurge, spotted knapweed, Dalmatian toadflax, houndstongue, and Canada thistle. Small infestations of Russian knapweed and diffuse knapweed have been found and promptly treated.

In the North Hills area, large infestations of low to moderate density leafy spurge occur throughout this sub-PA. Other noxious weeds present are Canada thistle, Dalmatian toadflax, and small patches of Russian knapweed.

In the Mt. Bend area, large infestations of Dalmatian toadflax occur throughout this sub-PA. Leafy spurge, houndstongue, and spotted knapweed are also present.

In the Ward Ranch/Centennial Gulch area, large infestations of Dalmatian toadflax and spotted knapweed occur throughout this sub-PA. Scattered infestations of Canada thistle, leafy spurge, and houndstongue have been observed. Undesirable invasive species present include prickly pear cactus and large infestations of musk thistle.

In the McMasters Hills/Spokane Bay area, several infestations of Dalmatian toadflax, leafy spurge, spotted knapweed, and Canada thistle are present. Scattered infestations of musk thistle were also observed.

In the Spokane Hills/Breaks area, there are large infestations of spotted knapweed, Dalmatian toadflax, and leafy spurge in this sub-PA. Noxious weeds present in smaller patches are Canada thistle, Russian knapweed, and diffuse knapweed.

Soils

Soils range in depth from shallow to very deep and are typically very to extremely gravelly loams and clay loams with a few sandy loams. Soils formed from argillites, quartzite, volcanics, alluvium, or limestone.

Cultural/Historic

Cultural resources in the Helena valley reflect all of the ways of life that have been used since people have lived in Montana. Prehistoric Native American hunting sites and living areas are as old as 10,000 years. They may be tool material sites, or rock features that probably served a number of uses before the arrival of Europeans. After their arrival, site types diversified to include European activities – mostly related to mining and ranching. The Ward and McMasters ranches were established before the turn of the 19th century. The Ward family engaged in mining and logging, as well as ranching. The McMasters ranch began as a blacksmith's shop servicing the local stage and individual travelers. As time passed, the family gradually turned to ranching full time.

Summary Public Scoping Comments

A well attended public scoping meeting was conducted for the East Helena TPA on November 30, 2004. Most of the written and oral comments received focused on the North Hills sub-PA; however several comments were also received for the newly acquired Ward and McMasters' ranch lands.

The majority of comments centered on conflicts between motorized and non-motorized recreation in the North Hills. A number of participants felt that accommodations could be made for both motorized and non-motorized uses. Strategies included creating separate areas of use for motorized and non-motorized activities, and seasonal closures. Other participants advocated prohibiting all motorized travel in favor of horse and pedestrian travel,

arguing the area is too small to provide motorized recreation opportunities.

Other issues and concerns were raised during the meeting included:

- Illegal activities - Dumping, drug use, underage alcohol use (keg parties), unattended camp fires, vandalism, and unauthorized travel.
- Target Shooting - A number of comments were made regarding unsafe and irresponsible shooting (trees destroyed).
- General need for improved boundary marking, signing, maps, and separate trailhead facilities for motorized and non-motorized users.
- Enforcement – Proactive law enforcement, increased uniformed patrols by BLM staff.
- Soil erosion.
- Noxious weeds.
- Wildland fire - In particular, WUI concerns adjacent to North Hills.

Lewis and Clark County Northwest Travel Planning Area

The 406,700-acre Lewis and Clark County Northwest TPA contains approximately 17,037 acres of BLM lands. There are approximately 68 miles of BLM roads, making up about 4.7 percent of the approximate total of 1,448 road miles in the TPA. The majority of roads (819 miles) lie on private lands.

Weather patterns for the lower elevations are similar to the Helena Valley, with average minimum/maximum temperatures of 8/29 degrees Fahrenheit in January, and 52/84 degrees Fahrenheit in July. Average annual precipitation is approximately 12 inches, with an average annual snowfall of 49 inches. Annual precipitation levels for the higher elevations range from 20 to 30 inches, with annual snowfall averaging 150 inches.

Four sub-PAs, known as Marysville/Great Divide Ski, Stemple Pass, Sieben Ranch, and Lincoln have been identified for planning efforts. Of the four, the Marysville/Great Divide Ski area has the most need for travel management, based on road density, current use level, and public scoping comments. **Maps 14 through 17** depict the Lewis and Clark County Northwest TPA.

The Marysville/Great Divide Ski sub-PA is located about 25 road miles northwest of Helena, Montana, and occupies approximately 12,178 acres. Marysville/Great Divide is bordered on the north and east by a combination of private and state lands, and on the west and south by USFS and private lands. The majority of the area is characterized by moderate (25 to 30 percent) to steep (50 percent) slopes. Elevations range from 5,700 to 7,230 feet. Upper elevation north and east facing slopes are heavily forested by lodge pole pine and sub-alpine fir,

while mid to lower elevations are Douglas fir and ponderosa pine. Low to upper elevation, west and south facing slopes are vegetated by fescue and bluebunch wheatgrass.

The Sieben Ranch sub-PA is located approximately 25 miles north of Helena, along the west side of Interstate-15. The sub-PA occupies approximately 1,612 acres. Sieben Ranch is bordered on the east by I-15, and on the north, west, and south by a combination of private and state lands. Medicine Rock Creek is the predominant feature, and flows easterly for approximately two miles through a moderately steep “V” shaped canyon. A graded dirt road parallels the creek bottom. Elevations range from 5,000 to 5,750 feet with the canyon’s north facing slopes ascending steeply from the creek bottom. North facing slopes are vegetated by a moderately dense forest of fir and ponderosa pine, while the dryer less steep south facing slopes are populated by pine. Open meadows are located along the bench tops, and along the southerly facing slopes.

The Stemple Pass sub-PA is located approximately 13 miles north of Marysville, and occupies approximately 2,040 acres. The physical environment is very similar to the Sieben Ranch sub-PA. Virginia Creek is the predominant feature, and flows easterly for approximately two miles through a deep “V” shaped canyon. Elevations range from approximately 4,900 to 6,500 feet with the canyon’s north and south facing slopes both ascending steeply from the creek bottom. The slopes are vegetated with moderately dense forest of spruce, fir, and ponderosa pine. Open meadows are located along the bench tops, and occasionally along the slopes.

The Lincoln sub-PA is located approximately 5 miles west of the town of Lincoln, and occupies approximately 894 acres. The physical environment is similar to the Sieben Ranch and Stemple Pass sub-PAs, but has higher levels of precipitation (approximately 15 to 19 inches). The Blackfoot River is the predominant feature, and flows westerly for approximately 1.5 miles through a “U” shaped canyon. Elevations range from approximately 4,250 feet along the river benches to 5,187 feet at Long Point. North facing slopes are vegetated by a moderately dense forest of western larch and fir, while the dryer south facing slopes are populated more heavily by ponderosa pine. Open meadows are located along the bench tops, and occasionally along the slopes.

Existing Land Use

Recreation

Recreational use is well established for the Marysville/Great Divide Ski area, particularly for winter sports. Winter sport activities include: snowmobiling, downhill skiing, backcountry skiing, ski racing, snowboarding, and snowshoeing. An extensive network of roads and trails support a wide range of off-season activities, including: camping, hunting, target practice, hiking, jogging, horseback riding, mountain bike riding, and

motorized use (motorcyclists, OHV riders, and 4-wheel drive enthusiasts).

Marysville was a thriving mining town in the late 1800’s, with a population of 4,000 at its peak. The core of Marysville is still present with approximately 50 structures in use and about 71 full time residents according to the 2000 U.S. Census. Additional residential development is located in the Canyon Creek and Little Prickly Pear areas.

The 1,600 acre Great Divide Ski resort, lies above the town of Marysville on the east flank of Mount Belmont, about 1 mile northeast of the Continental Divide. The Great Divide Skiing Company operates the resort under a lease agreement with the BLM (leasing approximately 900 acres) and private property owners. Great Divide Ski resort is not a destination resort (no lodging available), and relies heavily on a local market based in Helena. Visitation has increased from about 6,000 in the mid-1980s to over 60,000 during the 1998-1999 ski season. Approximately 1,200 visits are expected on a typical heavy use day. Current facilities include four chairlifts and a tow, a lodge (day-use only), a maintenance shop, snowmaking system, slope lighting system, parking lot, and 130 named trails.

The Stemple Pass, Sieben Ranch, and Lincoln sub-PAs receive limited recreation use. Stemple Pass and Sieben Ranch areas are frequented by big game hunters during the fall.

This TPA contains no developed recreation sites or SRMAs. All TPA lands are managed as part of the Butte FO Extensive Recreation Management Area. The only Special Designation in this area is a three-mile segment of the Continental Divide National Trail.

Mineral/Energy Development

The Marysville mining district is located west of Marysville. Production began in the early 1870s and by 1935 the district had produced \$31million dollars worth of gold and silver. No production records are available since that time. Recent production has been limited to the Belmont in the late 1980s and early 1990s. There are reportedly still reserves remaining in the Belmont.

Historical information in BLM’s LR2000 records indicates that 3,357 claims have been active throughout the Marysville area since 1977. Today only 40 claims remain active. While this decrease in the number of mining claims represents in part depletion of the high grade gold and silver deposits, it also represents cycles in the mining industry. The Montana Bureau of Mines and Geology evaluation ranked much of the area as having high mineral potential for future production. Additionally claims surrounding Bald Butte have been purchased by United Bolero for their molybdenum potential (molybdenum is used for steel hardening). Best estimates for reserves are 150 to 200 million tons at 0.05 to 0.07%

molybdenum. During winter 2006, Bolero began mining and is shipping ore to Philipsburg for processing.

Future mining production is always difficult to predict because it is a cyclic business that depends on technological abilities and market demand. However future mining nearly always reoccurs in old districts as these are the mineralized areas and multiple types of mineralization often occurs together. Therefore, the Marysville sub-PA has high potential for future mining and exploration.

Overall, there is low potential for leasable fluid mineral development throughout federal mineral estate lands in the Butte Field Office. However, in this context, the Reasonably Foreseeable Development Scenario for the Butte RMP identified approximately 20,640 acres of federal mineral estate lands in this TPA where oil and gas development potential is slightly higher (low to moderate) and may potentially occur.

Range Management

Fifteen grazing allotments exist in the TPA. The largest allotments are the Empire Creek, Drumlummon-Skelly, and Edwards Mountain allotments in the Marysville/Great Divide Ski sub-PA. Due to the extended drought conditions, the amount of active grazing use has been reduced in the last 4 to 5 years. Grazing use may increase if wetter climate conditions return.

Forest and Fire Management

Approximately 11,500 acres of inventoried forest land occur in the Lewis and Clark County NW TPA. The general character of the vegetation is forested in each of the sub-PAs, with large areas of cool, moist conifer and sub-alpine fir zones, and lower elevations dominated by the dry conifer zone. Some of the most productive forest lands in the Butte Field Office area occur in this area. Forest stands are mainly second growth, having been heavily affected by harvesting and use starting with area settlement in the late 19th century and continuing through the present. Few old growth stands exist and large wildfire events have not occurred since 1910. Most stands are considered to be commercial forest, and have few current limitations or restrictions as to the silvicultural practices and treatment techniques that may be utilized for forest management. With the exception of the Medicine Rock area, these lands are adjacent to and blend in with the Continental Divide Landscape, where a landscape analysis was completed by the Helena National Forest in 1996.

The Lewis and Clark County NW TPA has considerable areas of WUI (Wildland Urban Interface). The general character of the vegetation is forested in each of the sub-PAs, with large areas of cool, moist conifer and sub-alpine fir zones, and lower elevations dominated by the dry conifer zone. The fuels in the area are classified in the moderate to high hazard range. In 2000/2003 a fuels hazard assessment was done for the Marysville area.

Findings from that assessment show that 33 percent of forested stands are rated high and 40 percent are rated moderate for hazardous fuels conditions in the Marysville Fire Management Zone. In consideration of the wild-land urban interface that surrounds the area, the Lewis and Clark County NW TPA is a moderate to high priority for fuels reductions work in the future.

Fire suppression for the Lewis and Clark County NW TPA was delegated to the USFS as part of the offset of fire protection responsibilities in Montana.

Cultural/Historic

Lewis and Clark County hosts a number of archeological resources dating back as long as Montana has been inhabited, at least 10,000 years. Site types include the entire range of subsistence types; hunting, game and plant processing and general habitation, and religious sites are present in the area. The arrival of Europeans is elusive in the archeological record. The presence of European goods does not necessarily indicate contact, but trade for those goods. However, a few ranches and numerous mines began to populate the area to the extent that their remains make up the dominant site type in the area.

Marysville began as a mining camp that grew up around the Drumlummon mine, discovered in the late 1860s by Irish immigrant, Tom Cruse. In 1876, Cruse relocated his old claim, the Drumlummon, and prospected for about six years before hitting a very rich vein of silver. He built a five-stamp mill at the upper end of Silver Creek, and the town of Marysville began. In 1883, Cruse sold his mining interests to an English company for \$1,500,000. They proceeded to build two large stamp mills in Marysville, which operated for another 10 years. The waste piles from the mines were so rich that they were profitably leached two separate times.

Important Resource Issues

Wildlife

The Lewis and Clark TPA straddles the Continental Divide and historically provided high quality habitat for a variety of wildlife species. This TPA provides a diversity of habitats from agricultural fields to high elevation cool, moist forests.

BLM lands in the TPA are dominated by cool, moist forest with dry Douglas fir at the lower elevations (13,047 acres) and sagebrush and grassland meadows (3,990 acres). Forests in the TPA provide habitat for species including but not limited to: elk, moose, mule deer, coyote, red fox, bobcat, cougar, black bear, mountain lion, pine marten, river otter, beaver, snowshoe hare, mountain cottontail, marmot, red squirrel, and other small mammals.

Grasslands and sagebrush within the TPA provide habitat for elk, mule deer, coyote, red fox, mountain cottontail, ground squirrels, and other small mammals.

The TPA also provides habitat for forest and grassland bird species including but not limited to: pileated, hairy and downy woodpeckers, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, blue grouse, hairy and downy woodpeckers, dusky flycatcher, pine siskin, western tanager, black-capped chickadee, red-breasted nuthatch, mountain bluebird, Townsend's solitaire, dark-eyed junco, Cassin's finch, pine siskin, red crossbill, western meadowlark, Swainson's hawk, red-tailed hawk, horned lark, mountain bluebird and chipping sparrow.

Mule deer winter range is located along the eastern half of the TPA (158,140 acres) as well as near Lincoln (21,500 acres). Elk winter range is also located in the lower elevations along the eastern half of the TPA (193,800 acres) as well as around Lincoln (55,500 acres).

The western half of the TPA is within a wildlife movement corridor that provides a connection between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem. This corridor also provides local daily movements and seasonal movements between higher elevation summer range along the Continental Divide and lower elevation winter range. Although this corridor has fairly high road densities (greater than 2 mi/mi²) the quality of the corridor is moderate to high to wildlife based on the large amount of federal lands in the area.

The western half of the TPA (231,600 acres) is within the occupied range of grizzly bear extending south from the Northern Continental Divide recovery zone.

The Lewis and Clark County NW TPA is within the former Northwest Montana Recovery Area for the gray wolf. In 2003, a den site with a single female and five pups was located just south of the Great Divide Ski Area. The den was subsequently disturbed by humans and the female moved the five pups to an unknown location. Currently, there is one known pack in the area. Due to livestock loss, two other local packs were exterminated in February 2003.

Approximately 112,250 acres of cool, moist forest in the TPA provide habitat for the Canada lynx. The majority of lynx habitat is located in the western half of the area between Lincoln and Marysville. Dry, mature Douglas-fir, lodgepole pine, and ponderosa pine forest types at lower elevations provide habitat for the northern goshawk.

Two BLM sensitive amphibians have been found within the Lewis and Clark TPA, the boreal toad and the Northern leopard frog. Another BLM sensitive species, the wolverine, has also been documented west of the Continental Divide in the TPA.

The long history of mining in the Marysville area has created numerous habitats for bats. Bat species identified during surveys include: Townsend's big-eared bat (BLM

sensitive species), silver-haired bat, big brown bat, and several unknown myotis species.

Aquatics/Fisheries

This 406,700 acre TPA is found within the Upper Missouri (257,265 acres) and Blackfoot (149,435 acres) watersheds. There are approximately 238 miles of perennial streams and approximately 292 miles of fish bearing streams on all land ownerships in the TPA. Fish species found in the TPA include non-native brook, brown, and rainbow trout. Native fish species found in the TPA include; white sucker, mountain whitefish, longnose dace, longnose sucker, westslope cutthroat trout, mottled sculpin, and bull trout.

On BLM lands, there are approximately 7.0 miles of perennial stream, 11 miles of fish bearing stream and 6.3 miles of intermittent streams. Non-native fish species found on BLM lands in the TPA include brook, brown, and rainbow trout. Native fish found on BLM lands in the TPA include; white sucker, mountain whitefish, longnose dace, longnose sucker, westslope cutthroat trout, mottled sculpin, and bull trout. In the entire TPA, there are approximately 220 miles of stream with westslope cutthroat trout of varying genetic purity and approximately 65 miles with bull trout.

On BLM lands, westslope cutthroat trout are found in nine streams for approximately 7.7 miles. The longest length of stream with westslope cutthroat trout is Virginia Creek, with 2 miles. Only three streams have had genetic testing; the Blackfoot River, Sauerkraut Creek, and Sawmill Gulch. Of these streams, only Sauerkraut Creek was found to have 100 percent genetically pure westslope cutthroat trout (less than 0.1 mile is on BLM managed lands). The Blackfoot River flows through the northwest corner of the TPA near the town of Lincoln and provides the only bull trout habitat in the Butte Field Office. Bull trout are found in approximately 2.0 miles of the Blackfoot River in the Decision Area.

Water Resources

Within the entire Lewis and Clark County NW TPA there are 19 streams (totaling about 111.9 stream miles) that are listed as impaired water bodies by Montana Department of Environmental Quality. Impaired reaches of five of these streams (Blackfoot River – 1.9 miles, Jennies Fork – 0.2 mile, Little Prickly Pear Creek – 0.7 mile, Silver Creek – 0.03 mile, and Virginia Creek – 2.0 miles) flow through BLM managed lands. Key types of impairment include heavy metal contamination, siltation, and flow alteration.

Riparian

Approximately 18.7 miles of riparian reaches and associated habitat are found in the Lewis and Clark Northwest travel planning area. Current condition ratings on these reaches include 11.1 miles in Proper Functioning Condition, 5.6 miles Functioning-At-Risk condition, and

1.7 miles in non-functioning condition. Trends on most reaches are upward or static.

Currently, the roads and trails having the biggest impacts on riparian conditions in this TPA are the county road along Ottawa Gulch, the trail along Woodchopper Gulch, the road along Empire Creek, the road in Towsley Gulch, and the county road paralleling Virginia Creek. All of these roads affect stream channels to some degree as well as delivering extra sediment during runoff events.

Sensitive Plants

Habitat for yellow lady's slipper does occur in the Marysville area. No populations have been documented there however.

Noxious Weeds

The primary noxious weeds in the Lewis and Clark County NW TPA are spotted knapweed, houndstongue, leafy spurge, Dalmatian toadflax, yellow toadflax, whitetop, and Canada thistle.

In the Marysville/Great Divide Ski Area, observed infestations include large patches of spotted knapweed with smaller infestations of houndstongue, whitetop, yellow toadflax, and Canada thistle. Undesirable weeds present include musk thistle and common mullein.

The majority of the Stemple Pass area has spotted knapweed infestations ranging from low to high canopy cover densities. This area has the largest single infestation of noxious weeds of the four sub-PAs.

In the Sieben Ranch area, large infestations of spotted knapweed with smaller infestations of houndstongue, leafy spurge, and Dalmatian toadflax occur in this area. Undesirable weeds present include bull thistle, musk thistle, and common mullein.

In the Lincoln area, small patches of spotted knapweed have been found in this sub-PA.

Soils

Soils in the Lewis and Clark County NW TPA are from limestone, granite, argillite, and igneous rocks. They range from shallow to very deep and in texture from gravelly loams and clay loams to extremely stony loamy sand. Limestone soils are the most stable and granite soils the most erosive.

Summary Public Scoping Comments

A well attended public scoping meeting was conducted for the Lewis and Clark County NW TPA on December 2, 2004. Most of the written and oral comments received focused on the Marysville/Great Divide Ski sub-PA. There were many comments received regarding future management of the Continental Divide Trail. The majority of comments centered on conflicts between motorized and non-motorized recreation, including winter sports activities. A number of participants felt that ac-

commodations could be made for both motorized and non-motorized uses. Strategies included creating separate areas of use for motorized and non-motorized activities, and seasonal closures.

Other issues and concerns raised during the meeting included:

- Interagency Coordination – Maintain interagency connectivity and coordination with USFS and other adjacent agencies.
- Continental Divide Trail – Manage as non-motorized in cooperation with the USFS. Consider re-routing the existing trail away from existing or future planned motorized routes. Or, allow for motorized crossings at site specific junctions.
- Illegal activities – Dumping, drug use, underage alcohol use (keg parties), unattended camp fires, vandalism, and unauthorized travel.
- Access – Ensure access to mines and private property.
- General need for improved boundary marking, signing, maps, and separate trailhead facilities for motorized and non-motorized users
- Enforcement – Proactive law enforcement, increased uniformed patrols by BLM staff to ensure compliance with completed travel plan.
- Wildlife – Wildlife security and travel corridors.

Boulder/Jefferson City Travel Planning Area

The 60,418-acre Boulder/Jefferson City TPA contains approximately 14,487 acres of BLM lands. There are approximately 61 miles of BLM roads, making up about 15.6 percent of the approximate total of 392 road miles in the TPA. The majority of roads (212 miles) lie on private lands.

The largest contiguous portion of the TPA lies west of the town of Boulder; bounded on the south and east by Interstate-15. The remaining portion of the TPA extends northwards up to the community of Corbin. Several additional small communities (Fuller, Comet, Amazon, and Wickes) also lie within the TPA. Elevations range from 5,000 feet near Boulder to approximately 8,000 feet at Mt. Thompson. **Maps 18 through 21** depict the Boulder/Jefferson City TPA.

The area experiences four distinct seasons. Weather patterns for the lower elevations are similar to those for the Helena Valley, with average minimum/maximum temperatures of 8/29 degrees Fahrenheit in January, and 52/84 degrees Fahrenheit in July. Average annual precipitation is approximately 12 inches, with an average annual snowfall of 48 inches. Annual precipitation levels for the higher elevations range from 20 to 30 inches, with annual snowfall averaging 30 to 60 inches.

The majority of the area is characterized by moderately steep mountain terrain (15 to 35 percent slopes), punctuated by a number of small perennial and seasonal streams. North facing slopes are vegetated by a moderately dense forest of fir and ponderosa pine, while the dryer less steep south facing slopes are populated by pine. Occasional open meadows are located along the bench tops, and along the southerly facing slopes. Small stands of aspen can be found along the riparian areas. The lower elevations (located along the west side of I-15) are characterized by open sagebrush meadows with scattered juniper and pine groves.

Existing Land Use

Recreation

The Boulder/Jefferson City TPA contains a relatively dense network of BLM administered roads. Several maintained county roads (Big Limber Gulch, High Ore Creek, Finn Gulch, and Wickes) provide primary vehicle access. The majority of recreation use is by local and area residents. Primary recreation activities include Big Game hunting (deer, elk), OHV use (motorcyclists, ATV riders, 4-wheel drive), and winter snowmobiling. Other activities may include camping, hunting, target practice, hiking, jogging, horseback riding, and mountain bike riding. With the exception of some old mine sites, there are no known destination points or points of interest.

This TPA contains no developed recreation sites or SRMAs. All lands within this TPA are managed as part of the Butte FO Extensive Recreation Management Area. There are no Special Designations within this TPA.

Mineral/Energy Development

The Boulder/Jefferson City TPA is highly mineralized and thus incorporates numerous historic mining districts including Alhambra-Warm Springs, Amazon, Basin-Cataract, Boulder, Clancy-Lump Gulch, Colorado-Wickes-Corbin-Gregory, Golconda, and Montana City. Placer mines in the general area date back to the 1860s. Estimates report that placer mining in Jefferson County drainages alone produced 109,629 ounces of gold and 39,628 ounces of silver from 1902 to 1948 (Roby *et al.* 1960).

Placer mining was followed by lode mining in several drainages throughout the area. In 1890 Roby reports that three concentrating mills, six stamp mills, and four smelters were operating in Jefferson County.

The Free Enterprise was the largest producer of uranium in the area, although other occurrences are present in the district. Radioactivity is associated with silicified and altered zones in the batholith (Popoff and Irving 1952).

Limestone for smelter flux was quarried near Montana City at the turn of the century.

Presently the Montana Tunnels mine, centered on a large diatreme, operates an open pit mine. From 1984 to 2005 Montana Tunnels produced 1.3 million ounces of gold, 20 million ounces of silver, 312 million pounds of lead, and 853 million pounds of lead. Present mine permits allow mining to 2007 and the company is submitting a proposal to expand the operation to 2011.

The Golconda District (WSA area) has several mineralized deposits delineated to date. These include 750,000 tons of economic gold resources at a grade of 0.052 ounces per ton gold and a porphyry stock work, copper-molybdenum deposit containing what is described as at least 100 million tons of mineralized rock. The copper prospect was dropped in the late 1970s due to a decline in the price of copper at that time (USBM and USGS 1990).

Due to the strong mineralization in the area it is likely that there will be future proposals to explore for and possibly develop mineral deposits at some time in the future.

Range Management

Ten grazing allotments exist in the Boulder/Jefferson City TPA. The largest allotments are the High Ore, Sugarloaf, Boomerang and Amazon allotments. Due to the extended drought conditions and the Boulder complex fires in 2000, the amount of active grazing use has been reduced in the last 4 to 5 years. Grazing use may increase if wetter climate conditions return.

Forest Management

Approximately 9,500 acres of inventoried forest land occur in the Boulder/Jefferson City TPA. The general character of the vegetation consists of large areas forested with dry Douglas-fir conifer types found mainly on north and east aspects that are bisected with dry meadows, and large areas of open grass and sage vegetation on southerly aspects and broad ridges. Warm and dry ponderosa pine stands are found on south and west aspects, north of the Boulder Hills in the drainages that flow north toward the Missouri River by Helena.

The forest stands are mainly second growth, having been heavily affected by harvesting and use starting with area settlement in the late 19th century and continuing through the present. As a result, very few old growth stands remain in the TPA. A large, 12,500 acre wildfire complex occurred in the summer of 2000, where approximately 72 percent of the 4,000 acres of burned forests on BLM lands were severely damaged by stand replacement fire, potentially resulting in a quarter of the area considered to be deforested as few live trees remain for forest reestablishment in the large burn areas. The BLM planted 690 acres of the most severely burned with native conifers seedlings in 2002 and 2003.

While most stands were considered to be commercial forest, uneven aged silvicultural practices and treatment techniques have been proposed in current land use plan-

ning that would leave substantial over-story canopy elements in many areas under most treatment scenarios and would also require higher frequency treatment activities to achieve and maintain desired conditions through future planning cycles. The lands, mainly in and south of the Boulder Hills are located in the Boulder River Landscape, where the joint landscape analysis was completed with the Beaverhead-Deerlodge National Forest in 1998. The remaining lands occur in the Continental Divide Landscape, where the landscape analysis was completed by the Helena National Forest in 1996.

Cultural Resources

Cultural resources in the Boulder/Jefferson River valleys reflect all of the life-ways that have been used since people have lived in Montana. Prehistoric Native American hunting sites and living areas are as old as 10,000 years. There are tool material sites, rock features, shelters and various living areas that served a number of uses before the arrival of Europeans. After their arrival, site types diversified to include European activities – mostly related to mining and ranching.

Important Resource Issues

Wildlife

Habitat in this TPA is split almost evenly between Douglas fir or Douglas fir/lodgepole pine (30,000) and grasslands/shrublands (30,420 acres) with inclusions of willow, riparian habitat, and rocky outcrops. BLM lands in the TPA, however, are dominated by dry Douglas fir (9,500 acres) with sagebrush and grassland meadows (4,987 acres).

Forests throughout the TPA provide habitat for species including but not limited to: elk, moose, mule deer, coyote, red fox, bobcat, cougar, black bear, mountain lion, pine marten, snowshoe hare, mountain cottontail, marmot, red squirrel, and other small mammals.

Grasslands and sagebrush within the TPA provide habitat for elk, mule deer, pronghorn antelope, badger, coyote, red fox, mountain cottontail, whitetail jackrabbit, ground squirrels, and other small mammals.

The TPA provides habitat for forest and grassland bird species including but not limited to: pileated, hairy and downy woodpeckers, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, blue grouse, hairy and downy woodpeckers, dusky flycatcher, pine siskin, western tanager, black-capped chickadee, red-breasted nuthatch, Townsend's solitaire, dark-eyed junco, Cassin's finch, pine siskin, red crossbill, western meadowlark, Swainson's hawk, red-tailed hawk, horned lark, mountain bluebird, chipping sparrow, savannah sparrow and vesper sparrow.

The Boulder/Jefferson City TPA provides winter range for elk and mule deer. The entire TPA is considered winter range for elk while the lower elevations along the eastern half of the TPA are winter range for mule deer.

The quality of winter range is extremely variable throughout the TPA due to topography, elevation, and seasonal weather patterns.

The Boulder/Jefferson City TPA provides habitat for several BLM sensitive species including: flammulated owl, Brewer's sparrow, long-billed curlew, northern goshawk, black-backed and three-toed woodpeckers and long-eared bat. The long history of mining in the area has created habitats for bats but surveys have not been conducted to assess use of these features.

Aquatics/Fisheries

This TPA is found within the Upper Missouri (27,000 acres) and Boulder River (33,000 acres) watersheds. There are approximately 81 miles of perennial streams and 32 miles of fish bearing streams on all land ownerships in the TPA. Non-native fish species found in the TPA include brook, brown, and rainbow trout as well as stocked Yellowstone cutthroat trout in Cataract Creek. Native fish found in the TPA are westslope cutthroat trout and mottled sculpin.

On BLM lands, there are approximately 13.5 miles of perennial stream, 4 miles of fish bearing stream and approximately 13 miles of intermittent streams.

In the entire TPA, there are 16.5 miles of stream with westslope cutthroat trout in five streams (Kady Gulch, South Fork Quartz Creek, Sullivan Gulch, High Ore Creek, and Clancy Creek). All of the streams, with the exception of Sullivan Gulch, have 100 percent genetically pure westslope cutthroat trout.

BLM lands in the TPA provide approximately 3 miles of habitat for 100 percent genetically pure westslope cutthroat trout in the Boulder/Jefferson City TPA. Westslope cutthroat trout are found in 2 miles of High Ore Creek, 0.5 mile of Kady Gulch and 0.2 mile of Clancy Creek. High Ore Creek had extensive reclamation work within the stream and riparian area to restore the stream channel and water quality. Currently, rainbow trout, brook trout, and westslope cutthroat trout are found in the stream.

Water Resources

Within the entire Boulder/Jefferson City TPA there are 10 streams (totaling about 32.8 stream miles) that are listed as impaired water bodies by Montana Department of Environmental Quality. Impaired reaches of seven of these streams (Basin Creek – 0.04 mile, Big Limber Gulch – 1.55 miles, Boulder River – 0.9 mile, Cataract Creek – 0.4 mile, Clancy Creek – 0.2 mile, Corbin Creek 0.1 mile, and High Ore Creek – 2.1 miles) flow through BLM managed lands. The most commonly identified impairments for these streams include siltation, heavy metals contamination, and direct habitat alteration.

Riparian

Approximately 17.1 miles of riparian reaches and associated habitat are found in the Lewis and Clark North-

west travel planning area. Current condition ratings on these reaches include 2.0 miles in Proper Functioning Condition, 10.2 miles Functioning-At-Risk condition, and 5.0 miles in non-functioning condition. Many of the reaches were affected by historical mining. Trends on most reaches are upward or static.

Currently, the roads and trails having the biggest impacts on riparian conditions in this TPA are the county roads along High Ore Creek, the west fork of Spring Creek. BLM roads and trails affect riparian conditions along Kady Gulch, Boomerang Gulch, Black Jim Gulch, Stagecoach Gulch, and Big Limber Gulch. All of these roads affect stream channels and also deliver excess sediment during runoff events.

Sensitive Plants

Muskroot was observed in this area in 1892. Some potential habitat at the base of talus slopes occurs in this area.

Noxious Weeds

Noxious weed and non-native, invasive species are well-established and spreading rapidly in the Boulder/Jefferson City TPA. The primary noxious weeds in this area are Dalmatian toadflax, spotted knapweed, whitetop, houndstongue, and Canada thistle. Non-native invasive species found include musk thistle, common mullein, and black henbane. The spread of weeds on BLM lands is particularly apparent where surface soils or native vegetation are disturbed. Some of the major disturbance factors on BLM lands are construction of roads and OHV travel. A substantial number of infestations occur adjacent to roads, power lines, streams, ditches, and canals indicating that primary carriers of weed seed are vehicles and water. Ground-based activities, particularly those involving motor vehicles or equipment, disturb surface soils which has the effect of preparing a receptive seed bed for these pioneering weed species.

Soils

Soils in this area are derived mainly from granite. Granite soils are more erosive and less stable than soils derived from other rocks. They are mainly cobbly sandy loams and loamy sand textures.

Summary Public Scoping Comments

A public scoping meeting was conducted for the Boulder/Jefferson City TPA on November 16, 2004. The meeting was attended by six local residents. Most of the comments received during the meeting focused on Big Game hunting and winter sports (snowmobile) access. There were no comments or discussion regarding conflicts (either existing or potential) between motorized and non-motorized recreation, including winter sports activities. Other issues and concerns discussed during the meeting included:

- Interagency Coordination – Maintain interagency connectivity and coordination with USFS and other adjacent agencies, especially regarding winter snowmobile.
- Enforcement – Proactive law enforcement, increased uniformed patrols by BLM staff to ensure compliance with completed travel plan.

Upper Big Hole River Travel Planning Area

The Upper Big Hole River TPA is a relatively long, narrow shaped area (approximately 60 by 18 miles) located in the southwest portion of the Butte Field Office. This 357,275-acre TPA contains approximately 63,108 acres of BLM land. It includes BLM lands located along the north and south banks of the Upper Big Hole River as well as a large contiguous section located east of Interstate-15, near the town of Divide. A large contiguous portion extends south from Divide to the town of Melrose and includes the Humbug Spires Primitive Area. There are approximately 165 miles of BLM roads, making up about 12.6 percent of the approximate total of 1,309 road miles in the TPA. The majority of roads lie on private (540 miles) and Forest Service (459 miles) lands.

The western boundary of the Upper Big Hole River TPA is located approximately 10 miles east of the town of Wisdom, at the Deer Lodge/Beaverhead county line. From the western boundary, the TPA extends east for 32 miles to the town of Divide (near Interstate-15), and then easterly for an additional 28 miles, terminating at the common Jefferson/Silver Bow/Madison County boundary line. At its widest point (adjacent to I-15), the TPA extends south for approximately 18 miles, from the Feely Hill/I-15 exit to the town of Melrose. **Maps 22 through 25** depict the Upper Big Hole River TPA.

Weather patterns for the lower elevations are similar to those for Butte, Montana (elevation 5,549 feet). January has average temperatures of 28.4 degrees Fahrenheit for a high, and 4.2 degrees Fahrenheit for a low while July has average temperatures of 80 degrees Fahrenheit for highs, and 45 degrees for lows. Average annual precipitation is approximately 12 inches, with average annual cumulative snowfall 20 inches.

Annual precipitation levels for the higher elevations range from 20 to 30 inches, with annual snowfall averaging 36 to 60 inches.

The majority of the area is characterized by moderate (25 to 30 percent) to steep (50 percent) slopes, particularly along the Big Hole River corridor. Elevations (for BLM lands) range from approximately 5,200 to 7,200 feet. Upper to mid elevation north and east facing slopes are vegetated with sub-alpine fir, Douglas fir, spruce, and scattered aspen groves. Upper to mid-south facing slopes are vegetated with lodgepole pine. Low elevation, west and south facing slopes are vegetated with sage-

brush, lodge pole pine and occasional junipers. Vegetation along the Big Hole River corridor consists of sagebrush, willow, occasional cottonwood trees, and native grasses.

Existing Land Use

Recreation

Recreation use is well established in the Upper Big Hole River TPA, with fishing and big game hunting topping the list. The Big Hole River is one of Montana's finest trout streams, and has gained national recognition as a premiere fly fishing destination point.

From late May until the middle of June, fly-fisherman from all over the country come to the Big Hole for its "Salmon fly" hatch. The hatch begins around Twin Bridges and moves upstream as far as the East Bank Recreation site. The hatch moves 3 to 5 miles a day. The Big Hole River is the only river in the lower 48 states to host a large population of Arctic Grayling. The Big Hole hosts rainbow, brown, cutthroat, and brook trout. Rocky Mountain whitefish are also present.

Big game hunting is also well established in the Upper Big Hole TPA. The area receives use by local as well as non-resident hunters. Big game species include elk, mule deer, whitetail, antelope, black bear, mountain lion, and moose.

Other known recreational activities include: hiking, horseback riding, auto/OHV touring, upland game bird hunting, canoeing, kayaking, rock-hounding, gold panning, wildlife observation, and rock climbing (Humbug Spires).

A drive along the Big Hole River, from Divide west to Wisdom, and from Divide south to Twin Bridges, illustrates the importance of the Upper Big Hole to the regional economy. A number of motels, rental cabins, private/public campgrounds, restaurants, and outfitter and guide businesses are located along the river. A larger number of motels, sporting good stores, and outfitter and guide businesses located in the surrounding communities of Butte, Anaconda, and Dillon benefit directly from the Big Hole River as well.

This TPA contains 12 developed recreation sites (Divide Bridge CG, Sawmill Gulch TH, Divide Bridge Day Use, Titan Gulch, Jerry Creek Bridge, Dickie Bridge, Bryant Creek, East Bank, Sawlog Gulch, Pintlar Creek, Maiden Rock East, and Moose Creek TH) and two Special Recreation Management Areas (Upper Big Hole River and Humbug Spires). All remaining lands within the TPA are managed as part of the Butte FO Extensive Recreation Management Area.

Existing and potential Special Designations include Humbug Spires WSA, the Upper Big Hole eligible WSR, and the Humbug Spires potential ACEC.

Mineral/Energy Development

The Highland Mountains experienced both early placer production and later free-milling ore from lode mines producing gold silver copper, lead, and zinc. Rich ores were worked locally in arrastres or stamp mills or were shipped to local mills. Most production was recorded up to about 1937.

Moose Creek, Upper Camp Creek, and Soap Gulch each contained enough mineralization to classify as their own districts. Placer gold was worked intermittently but lack of high enough grades and sufficient water inhibited larger scale production. None of these areas carried sufficient grade or tonnage to yield larger scale profitable mines and production did not carry past the late 1930s.

Recent exploration has focused on placer deposits near the mouth of Soap Gulch and large scale targets for lead/zinc in the upper reaches of the drainage. A decorative slate operation is presently permitted in Soap Gulch. Phosphate from the Phosphoria Formation was produced on a larger scale in the area, and activity and interest have continued until recently.

Much of this area is strongly mineralized and may continue to see exploration and possible development in the future as commodity demands change over time.

Range Management

There are 42 grazing allotments in the Upper Big Hole TPA. The largest allotments are the Camp Creek Jerry Creek, and Copp-Jackson allotments. Due to the extended drought conditions, the amount of active grazing use has been reduced in the last 4 to 5 years. Grazing use may increase if wetter climate conditions return.

Forest Management

Approximately 30,000 acres of inventoried forest land that are managed by the Butte Field Office are located in the Upper Big Hole TPA. The general character of the vegetation is forested with large areas of cool, moist conifer and sub-alpine fir zones. The lower elevations and south facing slopes north of the Big Hole River are dominated by the dry conifer zone, mountain shrubs, or open grassy slopes. These are some of the most productive forest lands in the Butte Field Office. The forest stands are mainly second growth, having been heavily affected by harvesting and use starting with area settlement in the late 19th century and continuing through the present. There are few old growth stands and large wild-fire events have not occurred since 1910. Most stands are considered to be commercial forest and have few current limitations or restrictions as to the silvicultural practices and treatment techniques that may be utilized for forest management. Exceptions occur in the Humbug Spires WSA which is managed under non-impairment guidelines for lands under wilderness review, and the forested areas in close proximity to the Big Hole River and the nearby recreational developments where visual

characteristics are important considerations in all management activities and vegetation treatments. The lands south of the Big Hole River are located in the Pioneer Mountain Landscape, where the joint landscape analysis was completed with the Beaverhead-Deerlodge National Forest in 1998.

Cultural/Historic

Cultural resources in the Upper Big Hole River valley reflect all of the ways of life that have been used since people have lived in Montana. Prehistoric Native American hunting sites and living areas are as old as 10,000 years. The most well-known resource in the area is the Nez Perce Trail, the path taken by Chief Josef and the Nez Perce tribe as they engaged the US Army in 1877. The formally recognized trail does not include land in the Butte Field Office management unit, but the Big Hole River provided a means of escape for the warriors and their families. There are tool material sites, rock features, shelters and various living areas that served a number of uses before the arrival of Europeans. After their arrival, site types diversified to include European activities – mostly related to mining and ranching.

Important Resource Issues

Wildlife

This TPA provides a diversity of habitat from low elevation grasslands/shrublands to high elevation cool, moist forests. Upper Big Hole Travel Planning area is the “Crown Jewel” of wildlife habitat in the Butte Field Office. The TPA consists of a wide variety of vegetation that provide habitat for a multitude of wildlife species.

Forests in the TPA provide habitat for species including but not limited to: elk, moose, mule deer, coyote, red fox, bobcat, cougar, black bear, mountain lion, pine marten, river otter, beaver, snowshoe hare, mountain cottontail, marmot, flying squirrel, red squirrel, long-tailed weasel, and other small mammals.

Forested lands in the eastern portion of the Travel Plan area, including the Moose Creek drainage, provide a transition zone from lower elevation winter range to higher elevation wet forest type used by black bear, lynx, gray wolf, beaver, mink, coyote, and other forest associated species.

Grasslands and sagebrush within the TPA provide habitat for elk, mule deer, pronghorn antelope, bighorn sheep, coyote, red fox, badger, mountain cottontail, ground squirrels, and other small mammals. To the east, the Soap Gulch and Camp Creek drainages are dominated by grassland and sagebrush that provide important habitat for grassland species and sagebrush obligates including species such as sage grouse and sage thrasher. Other BLM sensitive species found in these habitat types include: long-billed curlew, brewer’s sparrow, Swainson’s hawk, and golden eagle.

The TPA provides habitat for a diversity of forest and grassland bird species including but not limited to: pileated, hairy and downy woodpeckers, Cooper’s hawk, sharp-shinned hawk, red-tailed hawk, great-horned owl, blue grouse, hairy and downy woodpeckers, dusky flycatcher, pine siskin, western tanager, black-capped chickadee, red-breasted nuthatch, Townsend’s solitaire, dark-eyed junco, Cassin’s finch, pine siskin, red crossbill, western meadowlark, Swainson’s hawk, red-tailed hawk, horned lark, mountain bluebird, and chipping sparrow.

BLM lands in the Big Hole Valley provide critical elk and mule deer winter range as well as calving habitat. BLM lands are within the transition zone between grassland/shrubland and forested habitats and provide essential habitat requirements for big game.

The eastern portion of the Travel Plan area also provides critical winter range for elk and mule deer as well as year round habitat for bighorn sheep.

Nearly the entire TPA is within core or subcore habitat. The Big Hole Valley provides a critical link from north to south and the east half of the Travel Plan area provides a corridor from the Highland Mountains to the Pintler/Pioneer Mountains. This corridor also provides for local daily movements and seasonal movements between higher elevation summer range along the Continental Divide and lower elevation winter range.

There are more known sightings of threatened, endangered and BLM sensitive species in this TPA than in any other area in the Field Office. Known sensitive species to occur in the PA include: arctic grayling, westslope cutthroat trout, boreal owl, boreal toad, spotted frog, tailed frog, wolverine, northern goshawk, pygmy rabbit, great gray owl, flammulated owl, four different bat species, fisher, sage grouse, sage thrasher, pileated woodpecker, golden eagle, Brewer’s sparrow, long-billed curlew, and the bald eagle.

Threatened or endangered species known to occur in the Planning Area include; Canada lynx and the grizzly bear.

The higher cool, moist forest in the Travel Plan area provides habitat for the Canada lynx. Dry, mature Douglas-fir and lodgepole pine forest types at lower elevations provide habitat for the northern goshawk. Almost all the known nest sites for the northern goshawk in the Butte Field Office occur in the Big Hole watershed.

The Upper Big Hole Valley has the northernmost known population of pygmy rabbits.

Although the Planning area is not within a designated recovery or distribution zone for grizzly bear, the entire western half of the TPA, is considered to be high quality habitat for grizzly bear and sightings of grizzly bears often occur.

Aquatics/Fisheries

The Big Hole River is a world renowned trout fishery and is one of only a few free flowing rivers left in the west. The lower Big Hole is classified as a Blue Ribbon Fishery and hosts rainbow, brown, westslope cutthroat and brook trout. Rocky Mountain whitefish are also present. The river is refuge for the last wild population of fluvial Arctic grayling, a trout species now limited to the Big Hole River in the lower 48 states.

There are approximately 223 miles of perennial streams and 276 miles of fish bearing streams on all land ownerships in the TPA. Fish species found in the TPA include non-native brook, brown, rainbow trout, stocked Yellowstone trout and common carp. Native fish found in the TPA include: white sucker, longnose sucker, burbot, arctic grayling, westslope cutthroat trout, and mottled sculpin.

On BLM lands, there are approximately 41 miles of perennial stream, 19 miles of fish bearing stream and 31 miles of intermittent stream. Fish species found in the TPA include non-native brook, brown, rainbow trout, common carp and stocked Yellowstone cutthroat trout. Native fish found on BLM managed lands in the TPA include: white sucker, longnose sucker, burbot, arctic grayling, westslope cutthroat trout, and mottled sculpin.

As of 2003, there were 45 conservation populations of westslope cutthroat trout inhabiting 167 miles of stream within the Big Hole watershed. Almost all stream segments occupied by westslope cutthroat trout that showed no genetic introgression were classified as conservation populations.

In the Upper Big Hole TPA, there are 15 streams on BLM lands with westslope cutthroat trout and westslope cutthroat trout are found in approximately 19 miles of stream. Genetic testing has been conducted on cutthroat trout from eight streams; westslope cutthroat trout from Bear Creek and Fish Creek were found to 100 percent genetically pure.

Arctic grayling were once widespread in the Missouri River drainage upstream of Great Falls. During the 20th century, the range of fluvial grayling became restricted to the Big Hole River, which represents about four percent of its native range. The Montana Fluvial Arctic Grayling Restoration Plan was developed to recover fluvial Arctic grayling with the goal of at least five stable, viable populations distributed throughout at least three of the major river drainages within the historic range of Montana grayling. Reasons for decline of arctic grayling include: competition from non-native salmonids, overfishing, habitat degradation, drought, stream dewatering and irrigation diversions.

In the entire TPA there are seven streams with arctic grayling, and grayling are found in approximately 73 total miles of the seven streams.

In the Decision Area, arctic grayling are found within three streams in the TPA; the Big Hole River, Deep Creek, and LaMarche Creek. Arctic grayling are found within approximately 4.4 miles of stream on BLM lands.

In 1994, stretches of the river reached alarmingly low levels as drought conditions parched the region and irrigators diverted water for cattle and hay fields. That same year, the USFWS decided that protection of the grayling was "warranted but precluded" under the Endangered Species Act (ESA). In a 2007 ruling, the USFWS determined that listing was not warranted, as the fluvial arctic grayling does not constitute a distinct population segment as defined by the ESA. The river was also being considered by the Montana Department of Natural Resources and Conservation under a statute that called for identifying "chronically de-watered" rivers in the state. Such a designation would have meant installing measuring devices on all water diversions from the main stem of the river. The State of Montana precluded listing on the idea that cooperative efforts from local irrigators were needed to increase stream flows to 60 cubic feet per second (cfs). Ensuring a minimum in-stream flow for the long-term is necessary to protect a self-sustaining, healthy population of fluvial arctic grayling.

In 2004, the federal Natural Resources Conservation Service offered ranchers payment for not irrigating their hay meadows and pastures. The goal was to leave more water in the Upper Big Hole to aid in the survival of stream living grayling. During this year, the water level rose from 30 cfs to 159 cfs after irrigation stopped.

Water Resources

Montana's Big Hole River winds through the mountain ranges, steep canyons and rolling sagebrush prairie south of Butte. This un-dammed river runs over 150 miles from its headwaters above Jackson, elevation 7,340 feet, to its confluence with the Beaverhead and Ruby Rivers in Twin Bridges, where they form the Jefferson River at an elevation of 4,600 feet.

Although the Big Hole watershed encompasses nearly 1.8 million acres, only about 2,000 people live in the area, many of them making their living by ranching and hay farming. Other uses for land within the watershed basin include tourism, recreation, and outfitting. The Big Hole River is also a water source for the city of Butte.

Approximately 419,946 acres of the Big Hole watershed are within the Butte Field Office with 61,236 acres (15 percent) managed by BLM, 209,147 acres (50 percent) of USFS lands, 46,074 acres (11 percent) state lands, and 103,489 acres (25 percent) of private lands.

Thirty-six water bodies in the Big Hole Watershed are on the draft MDEQ 303(d) list for a wide range of reasons including, but not limited to, metals contamination, flow alteration, habitat alteration, siltation, and stream-bank destabilization. Approximately 26.6 miles of

streams listed as impaired flow through BLM lands in this TPA.

Riparian

The Upper Big Hole River TPA includes approximately 90 miles of riparian areas divided into 137 riparian reaches on BLM land. Some of the reaches were affected by historical mining, logging, and grazing regimes. Current condition ratings on these reaches include 50.2 miles in Proper Functioning Condition, 36.8 miles Functioning-At-Risk condition, and 1.5 miles in non-functioning condition. Trends on most reaches are upward or static.

Currently, the roads and trails having the biggest impacts on riparian conditions in this TPA are the roads along Camp Creek, Soap Gulch, McLean Creek, Moose Creek, Bear Creek, Sawlog Gulch, and Charcoal Gulch. Mitigation work has been conducted on all of these roads; however they all affect stream channels and sediment delivery to some degree.

Sensitive Plants

Three BLM sensitive plant species—*Lemhi beardtongue* (*Penstemon lemhiensis*), *Sapphire rockcress* (*Arabis fecunda*), and *Idaho sedge* (*Carex idahoensis*)—are known to occur within the Upper Big Hole River TPA.

Noxious Weeds

The primary noxious weeds in the Upper Big Hole River TPA are spotted knapweed, leafy spurge, yellow toadflax, Dalmatian toadflax, houndstongue, and Canada thistle. Small, isolated infestations of oxeye daisy and diffuse knapweed have been observed. Some undesirable, invasive species found include common mullein, black henbane, and musk thistle.

Soil

Soils are derived mainly from three types of parent material, Limestone, Granite and mixed materials, mostly argillites. Limestone soils are the least erosive and the most stable. They are mainly very gravelly loams. Granite soils are the most erosive and least stable and are mainly cobbly sandy loams. Soils from mixed parent materials (argillites) are intermediate in erosiveness and stability between limestone soils and soils from mixed parent material.

Summary Public Scoping Comments

A public scoping meeting was held for the Upper Big Hole TPA on November 15, 2004. The meeting was attended by four local residents. The majority of comments received concerned the adverse effects of motorized use on big game hunting. Several comments were made expressing concern over “too much motorized access”, and advocated reducing road density by closing redundant roads/trails, as well as designating specific non-motorized walk-in hunting areas. None of the comments received advocated increasing motorized use. The

overall tone of the comments was to maintain the “primitive” character of the Upper Big Hole River corridor and adjacent lands. Other issues and concerns discussed during the meeting included:

- Interagency Coordination – Maintain interagency connectivity and coordination with USFS and other adjacent agencies.
- Enforcement - Proactive law enforcement, increased uniformed patrols by BLM staff to ensure compliance with completed travel plan.
- Maps/Signs - Provide quality travel plan maps and designated route signs.
- Public Access- Seek public access (easements) to Alder Creek and Tie Creek.

LANDS AND REALTY

The Butte Field Office (BFO) Lands and Realty program is responsible for management of land use authorizations including right-of-way grants, road use agreements, land use permits, leases, and easements; land ownership adjustments including land acquisition, disposal, exchange, transfer, and donation; access to BLM land; land withdrawals; and unauthorized use including trespass identification and abatement. The Lands and Realty program supports other BFO resource management programs and occasionally those of local, state, and other federal agencies. BLM land with unique or special values can be designated for specific purposes such as recreation development, and for cultural, historic, or other resource value protection. BLM can provide land for community expansion through public sale or exchange. BLM can also provide land for recreation and public purpose uses. Examples include, but are not limited to schools, community buildings, municipal/law enforcement facilities, hospitals, fire stations, parks, and recreation sites.

The 1984 Headwaters RMP encompassed 311,337 surface acres and 655,505 acres of federal mineral estate located in nine counties in west-central Montana including Broadwater, Cascade, Gallatin, Jefferson, Lewis and Clark, Meagher, Park, Pondera, and Teton (USDI-BLM 1983).

In April 1993, District Office (Field Office) jurisdictional boundaries were adjusted. The BFO now has the management responsibilities for eight counties: Broadwater, Deer Lodge, Gallatin, Jefferson, Lewis and Clark (southern portion), Park, Silver Bow, and a portion of Beaverhead County along the Big Hole River (**AMS Figures 2-27a, 2-27b, and 2-27c**).

Most of the BLM land (89 percent) is located in four counties, Broadwater, Jefferson, Lewis and Clark, and Silver Bow (**Table 3-26**). Most of the producing agricultural land in the resource area was patented under homestead laws, most known mineral land was patented under mining laws, and most of the forested land was withdrawn for administration by the USFS.

Table 3-26 Public Land by County in the Decision Area	
County	Acres
Broadwater	70,679
Deer Lodge	5,227
Gallatin	7,250
Jefferson	94,397
Lewis and Clark (southern portion)	63,510
Park	8,365
Silver Bow	45,221
Beaverhead (portion along Big Hole River)	12,660
Total Acreage	307,309

Some large blocks of BLM land still exist, but in general, historic disposal policies have resulted in a scattered land ownership pattern. Some of the BLM land consists of isolated tracts surrounded by private land or the tracts are situated next to National Forest Land. It is common to find very small BLM parcels among patented mining claims.

Land Use Authorizations

The BFO analyzes requests for land use authorizations on a case-by-case basis and through the environmental review process, and applies mitigation measures and Best Management Practices.

Land use authorizations on BLM land include right-of-way grants; road use agreements; temporary use permits under several different authorities; leases, permits under Section 302 of FLPMA; airport leases under the Act of May 24, 1928; and Recreation and Public Purposes (R&PP) Act leases. For the purposes of this planning effort, R&PP patent transfers, unlike R&PP leases, are considered “land ownership adjustments” and are covered below under that heading.

The BFO administers approximately 554 rights-of-way, which encumber over 40,837 acres of BLM land (USDI-BLM 2004d). These existing grants are for a myriad of different facilities and are held by private individuals and groups as well as various business and government entities. Rights-of-way for roads, telephone lines, electric transmission lines, and pipelines constitute a major portion of existing land uses and requests for new authorizations. Various types of road rights-of-way are the most common types, accounting for 53 percent or over half of the total number of grants. Examples of additional types of rights-of-way facilities authorized within the Decision Area (DA) include water pipelines, communication sites, ditches, railroads, material sites, fiber optic lines, and a Montana Army National Guard training site. The BFO processes approximately 10 to 15 right-of-way actions annually. These include right-of-way applications for new facilities as well as amendments, assignments, renewals, or relinquishments of existing right-of-

way grants. Communication Sites and Utility Corridors are discussed below in a subsequent section.

The BFO administers seven FLPMA Section 302 leases involving about 910 acres of BLM land. This includes 904.91 acres at Great Divide Ski Area and 3.9 acres at Holter Lake Lodge under commercial occupancy lease, and a total of 1.39 acres for five occupancy leases. There are no permits or easements under Section 302 of FLPMA or airport leases located within the DA. One R&PP lease has been issued under Section 212 of FLPMA to the Last Chance Handgunners involving 39.1 acres (USDI-BLM 2004i). R&PP patent transfers are discussed below under the section Land Ownership Adjustment.

One of the larger tracts of BLM land, approximately 20,000 acres in the Limestone Hills west of Townsend, is utilized under a right-of-way grant to the Montana Army National Guard for military training purposes (USDI-BLM 1984b). The 30-year right-of-way was granted in 1984 and expires in 2014. Eighty-eight percent of the land in the training area is administered by the BLM, with the remainder under state and private ownership (USDI-BLM 2004e). Military training over the years has resulted in unexploded ordnance (UXO) contamination, particularly within the interior 5,000-acre impact area. Based on BLM policy, the BFO implemented an emergency closure on the impact area. The Montana Army National Guard was also advised that its right-of-way for the range would not be renewed upon expiration in 2014, and the only way to assure its continued use of the area was through a military withdrawal. In September 2003, the Department of the Army announced its intent to prepare a legislative EIS for the withdrawal of the approximately 20,000 acres of BLM land that support training exercises at the Limestone Hills Training Area.

RENEWABLE ENERGY

Renewable energy includes solar power, wind, biomass, and geothermal resources. As demand has increased for clean and viable energy to power the nation, consideration of renewable energy sources available on public lands has come to the forefront of land management planning.

In cooperation with the National Renewable Energy Laboratory (NREL), the BLM assessed renewable energy resources on public lands in the western United States (BLM and DOE 2003). The assessment reviewed the potential for concentrated solar power, photovoltaic, wind biomass, and geothermal energy on BLM, BIA, and Forest Service lands in the west. Hydropower was not addressed in the BLM/NREL report.

Concentrating Solar Power (CSP): This technology uses sunlight concentrated on a single point to generate power. The BLM/NREL study indicates that the potential for this type of renewable energy lies primarily in states to

the south and southwest of Montana. No BLM lands within the DA were identified as having potential for this type of energy source. In keeping with this assessment, the BFO has not had any expressions of interest in developing CSP facilities on public lands.

Photovoltaics (PV): Photovoltaics technology makes use of semiconductors in PV panels (modules) to convert sunlight directly into electricity. The BLM/NREL study did not identify the BFO as one of the top 25 PAs for PV potential. To date, the BFO has not authorized any PV facilities strictly for commercial power production, nor has any interest been expressed by industry in developing such facilities on BLM lands.

Wind Resources: Wind power classes range from one (lowest) to seven (highest). BLM-managed lands in approximately 13 percent of the DA are Class 3 and higher. The BLM/NREL study did not identify the BFO as one of the top 25 PAs for wind energy potential. The Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2004b) categorizes BLM-administered lands into areas having low, medium, or high potential for wind energy development from 2005 through 2025, on the basis of their wind power classification. Wind resources in Class 3 and higher could be developed economically with current technology over the next 20 years. Class 3 resources have medium potential; resources in Classes 4 and higher have high potential. The Programmatic EIS identifies scattered public land parcels in the DA with medium or high wind resource potential that might be developed economically with current technology. **Map 40** shows lands within the DA with Class 3 or higher wind power potential.

Two sites in the BFO have been seriously considered for development by the private sector. One is on BLM lands south of Interstate 90 at Livingston, where a previous wind power project was located in the 1980s (**Map 40**). Park County has turbines on private land next to BLM at this location. The other site is at the Golden Sunlight Mine at Whitehall. Wind data is being collected there under a BLM permit at the present time.

Guidelines from the Wind Energy Development Programmatic EIS (ROD signed December 2005) would be used when considering wind energy projects on BLM land.

Biomass: The BLM/NREL study identified the BFO as one of the top 25 BLM planning units having high potential for biomass resources. However to date, utilization of small diameter forest material has been sporadic at best to non-existent. This is due to long haul distances to pulp facilities and low return pulp markets. Some of this material is used through personal use firewood permits. Utilization of this material for biomass related energy production has not been a factor. No such facility

exists in this region. Use of small diameter wood products or residue is currently encouraged when possible.

Geothermal: Geothermal resources are addressed under the *Energy Minerals-Fluid Leasable Minerals* section through the RMP.

The BFO has received inquiries from several individuals and companies regarding renewable energy projects. One of the primary limiting factors in site selection is access to power transmission interconnects, as well as acquisition of permits and power purchase agreements between the producer and owner of the power lines.

Land Ownership Adjustment

Land ownership adjustment refers to those actions that result in the disposal of BLM land and/or the acquisition of non-federal land or interest in land.

Current planning guidance with respect to land ownership is provided by the 1984 Headwaters RMP and the 1979 Dillon MFP. Further and more specific guidance was provided by the “Land Pattern Review and Land Adjustment, Supplement to the State Director Guidance for Resource Management Planning in Montana and the Dakotas, 1984” (USDI-BLM 1984b). This guidance was later amended by the 1989 State Director’s guidance pertaining to access (see the *Access* section below). This direction established land exchange as the predominant method of land ownership adjustment. It also established retention, disposal, and acquisition criteria to be used in categorizing public land. Criteria in the supplement were used to identify retention and disposal zones within the DA.

There are approximately 298,944 acres (97 percent) of BLM land located within retention zones in the DA. These retention zones typically include the better blocked BLM lands that meet retention criteria. Although land in retention zones can be disposed of when significant public benefits are realized, the goal, generally, is to retain or enhance BLM land holdings within these zones. Land outside these retention zones is generally available for the full range of land ownership adjustment opportunities – including retention, exchange, sale, or transfer. Land ownership adjustment proposals in the DA are analyzed in project specific reviews using the aforementioned guidance.

The primary means of land ownership adjustment within the DA has been through exchange. Thirteen exchanges affecting BLM land and/or non-federal land within the PA have been completed since the implementation of the Headwaters RMP in July 1984.

The BFO has been using exchanges to improve public land ownership patterns by generally disposing of small, isolated tracts of BLM land with limited resource values and acquiring non-federal land with higher resource values adjacent to larger blocks of BLM land. Land in the DA has also been used in exchanges mandated by Congress for other agencies. During this same time

period, the BFO completed four Land and Water Conservation Fund purchases: one in the Devil's Elbow area, two associated with Crimson Bluffs, the McMasters Ranch, and one on the Ward Ranch near Hauser Lake. Eight donations to the government were also processed: three for recreation sites (White Sandy, Log Gulch, and Holter Dam), three during the acquisition of Ward Ranch, and two during the acquisition of the Iron Mask property. The BFO completed three land sales, one southeast of Mount Helena, one near Montana City, and one east of Holter Lake.

Table 3-27 lists land ownership adjustment actions for the PA since the approval of the Headwaters RMP in July 1984.

Table 3-27 Land Ownership Adjustment Actions Since July 1984 in the Decision Area			
Type of Action	Number of Actions	Acres Disposed	Acres Acquired
Public Sales	3	10	0
Purchases	4	0	140
LWCF Purchases	9	0	8,987
Donations	7	0	2,352
R&PP Patent transfers	5	1,168	0
Land Exchanges	13	23,290	18,895
Total Acres		24,468	30,374

Note that acreages are approximate.

The R&PP Act authorizes the issuance of a land patent, with reversionary provisions, for BLM land when it serves the public interest. The BFO completed five R&PP patent transfers since approval of the Headwaters RMP.

These are:

- 34.09 acres to the MFWP for a recreation site.
- 40 acres in Lewis and Clark County for a sewage treatment area.
- 71.62 acres to Jefferson County for a warehouse and storage area.
- 400 acres to Broadwater County for a shooting range.
- 622.38 acres to MFWP for expansion of the Bear-tooth State Wildlife Management Area.

During this same time period, no lands have been conveyed for agricultural entries under the Desert Land Act or Carey Act, nor have any lands been conveyed for airport grants, Indian allotments, color-of-title actions, railroads, or state grants.

Access

For the purposes of this section, access refers to the physical ability and legal right of the public, agency personnel, and authorized users to reach public land. The lands and realty program primarily assists in the acquisition of easements to provide for legal access where other programs have identified a need.

Access to BLM land is an issue of concern to both agency personnel and the public. The PA's existing fragmented ownership pattern of BLM land, intermingled with private, state, and other Federal land, complicates the access situation. While the BFO has and is currently making progress in terms of improving access to public lands, there are still areas within the PA that lack legal access. Current planning guidance with respect to access is provided by the Headwaters RMP as supplemented by guidance prepared by the Montana State Office on access (USDI-BLM 1989a).

In accordance with guidance in this latter document, the BFO has been focusing its access acquisition efforts on:

- Larger blocks of BLM land, which are designated for retention in BLM ownership.
- Areas with important resource values.
- Areas where public demand for access is high.
- Areas with substantial BLM investments.

Generally speaking, access is acquired from willing landowners on a case-by-case basis as needs or opportunities arise, using criteria and direction provided in the guidance referred to above.

The BFO uses acquisition of road and trail easements as the primary means of obtaining legal access to public lands where it does not currently exist. There are three types of easements: exclusive easements, where the BLM acquires full public rights to the road in perpetuity and exclusively manages all other road uses; nonexclusive easements, where the BLM acquires only the right to use the road in perpetuity but does not control other uses; and temporary easements, where the BLM acquires the right to use the road for only a fixed period.

Since 1984, the BFO has acquired 40 permanent exclusive easements, which provide legal access to BLM land for the U.S. and its assignees, licensees, permittees, and the general public. The BFO has acquired six permanent non-exclusive easements, which provide legal access to BLM land but usually do not include access for the general public. The BFO has also acquired 11 temporary easements, encroachment permits and easements or permanent easements for specific projects such as fences, livestock or water pipelines and troughs (USDI-BLM 2004d).

Since the completion of the Headwaters RMP in 1984, the BFO has acquired access-related easements at the average rate of about four per year. When possible,

emphasis for easement acquisition is on those roads or trails identified through a route analysis process.

Most of the larger tracts of BLM land have legal public access via existing federal, state, and county road systems. Many smaller tracts of BLM land do not have legal access. In most cases, such parcels do not have resource values to justify public interest in acquiring access. Some small tracts of BLM along rivers serve as important public access points and require protection of existing legal access or acquisition of new legal access.

Although used much less frequently than easement acquisition, the BFO uses land exchanges on occasion to acquire needed access to public lands. Access is typically just one of many benefits of these exchanges. The consolidation of BLM land ownership patterns by exchange has generally improved the access situation in the DA. When disposing of BLM parcels containing roads or trails necessary for access to other federal land, the BFO protects these access routes by reserving access rights in conveyance documents.

Withdrawals

A withdrawal is a formal action that sets aside, withholds, or reserves Federal lands by administrative order or statute for public purposes. The effect of a withdrawal is to accomplish one or more of the following:

- Segregates (close) Federal land to the operation of all or some of the public land laws and / or mineral laws.
- Transfers total or partial jurisdiction of Federal land between Federal agencies.
- Dedicate BLM land for a specific public purpose.

Withdrawals can be categorized into three major types including:

- Congressional – legislative withdrawals made by Congress in the form of public laws. Examples include designation for wild and scenic rivers or wilderness.
- Administrative – withdrawals made by the President, Secretary of the Interior, or other officers of the executive branch of the Federal Government. Examples include stock driveways, resource protection, and public water reserves.
- Federal Power Act – power project withdrawals established under the Federal Power Act of June 10, 1920. These withdrawals are automatically created upon the filing of an application for hydroelectric power development with the Federal Energy Regulatory Commission (FERC).

There are approximately 6,300 BLM surface acres in the DA with some type of withdrawal on them. Types of withdrawals are described below.

BLM Recreation Sites: The BFO currently has one recreation site which is administratively withdrawn.

Devil's Elbow Recreation Site is withdrawn from surface disposal and mining, but not from mineral leasing.

Public Water Reserves: These include a number of administrative withdrawal actions over the years for spring areas set aside for public use. These areas are scattered throughout the DA and are withdrawn from surface disposal and nonmetalliferous mining, but not from metalliferous mining and mineral leasing.

BLM Protective Withdrawals: This includes administrative withdrawals on lands acquired for wetland, riparian, recreation, and wildlife values. These lands are generally withdrawn from surface disposal and mining, but not from mineral leasing.

USFS Administrative Sites: These are administrative withdrawals for U.S. Forest Service administrative sites located outside Forest Service boundaries.

Power Site Reserves and Classifications: There are numerous power site reserves and classifications within the DA. These are administrative withdrawals that protect water/power development potential. Generally speaking, these sites are withdrawn from surface disposal only.

FERC Power Project: These withdrawals are administered by FERC. Lands included in an application for hydroelectric power development with FERC are automatically segregated from surface disposal. At the time FERC issues a license or preliminary permit, the lands are automatically closed to location and entry under the mining laws, but are still available for mineral leasing.

The BFO considers requests for new withdrawals and withdrawal revocations, extensions, or modifications on a case-by-case basis. Existing withdrawals are reviewed on a case-by-case basis prior to the end of the withdrawal period or as otherwise required by law to determine whether they should be extended, revoked, or modified.

It should be noted that while BLM land classifications are not formal withdrawals, they are considered “de facto” withdrawals since most land classifications also segregate public lands from the operation of all or some of the public land laws and/or mineral laws. A BLM land classification accomplishes one of the following:

- Determines if BLM land is suitable for certain types of entry (disposal or lease) under the public land laws (for example, R&PP Act leases and patents).
- Determines if BLM land is suitable for retention for multiple-use management.

Historically, much of the DA was under classification for retention for multiple-use pursuant to the Classification and Multiple Use Act (C&MU) of 1964. With the passage of FLPMA in 1976 and its direction that BLM lands generally be retained in public ownership, these C&MU classifications within the DA were deemed unnecessary and were terminated.

Any new classification actions since the completion of the 1984 Headwaters RMP have been in response to R&PP Act lease or patent applications or sale actions.

In September 2003, the Department of the Army announced its intent to prepare a legislative EIS for the withdrawal of approximately 20,000 acres of land that support training exercises at the Limestone Hills Training Area. The BFO is currently processing an application for the military withdrawal of 20,000 acres at the Limestone Hills Training Area and is a cooperating agency for the project EIS. A draft of the EIS is scheduled to be completed in the spring of 2007.

Unauthorized Use

Trespass actions under the Lands and Realty program can be split into three separate categories. These include:

- Unauthorized Use.
- Unauthorized Occupancy.
- Unauthorized Development.

Unauthorized use refers to activities that do not appreciably alter the physical character of the public land or vegetative resources. Some examples of unauthorized use include the abandonment of property or trash, enclosures, and use of existing roads and trails for purposes that require a use fee or right-of-way. Unauthorized Occupancy refers to activities that result in full or part-time human occupancy or use. An example would be the construction, placement, occupancy, or assertion of ownership of a facility or structure (cabin, house, natural shelter, trailer, etc.). Unauthorized Development means an activity that physically alters the character of BLM land or vegetative resources. Examples include cultivation of public lands, road or trail construction or realignment, or unauthorized utility construction.

The BFO attempts to abate trespass through prevention, detection, and resolution. In the Lands and Realty program, priority for resolving trespass in the DA is accorded to those newly discovered ongoing uses, developments, or occupancies where resource damage is occurring and needs to be halted to prevent further environmental degradation. Lesser priority is accorded to those historic trespass cases where little or no resource damage is occurring. Lands and Realty trespass cases in this latter category are resolved as time permits.

COMMUNICATION SITES AND UTILITY CORRIDORS

Twenty communication site rights-of-way occupying seven different communication site locations are authorized within the DA (AMS Figure 2-28 and Table 3-28).

Potential new users are encouraged to locate at the existing sites within existing facilities. Communication site plans exist for all seven sites.

Table 3-28	
Communication Sites and Locations in the DA	
Communication Site	Legal Description (Principle Meridian, Montana)
Boulder	T.6N., R.4W., Sec. 19, SE¼ NW¼
Bull Mountain	T.2N., R.3W., Sec. 18, SW¼ SE¼
Limestone Hills	T.6N., R.1E., Sec. 20, NE¼ NW¼
Montana City	T.9N., R.3W., Sec. 25, W½ NW¼
Mount Belmont	T.12N., R.6W., Sec. 34, Lot 9
Toston	T.4N., R.3E., Sec. 8, SE¼ NW¼
Wickes/Boulder Hill	T.7N., R.4E., Sec. 28, Lot 10

The DA is traversed by a number of rights-of-way that are authorized for utility uses. In accordance with the direction provided in the Headwaters RMP, attempts are made to group compatible right-of-way facilities where feasible. However, the BFO currently has no formally designated right-of way corridors.

SPECIAL DESIGNATIONS

Special designations include Wilderness Areas, Wilderness Study Areas, Areas of Critical Environmental Concern, Research Natural Areas, Outstanding Natural Areas, National Recreation Areas, Back Country Byways, National Trails, watchable wildlife viewing sites, and Wild and Scenic Rivers.

There are no Research Natural Areas, Outstanding Natural Areas), National Recreation Areas, Back Country Byways, watchable wildlife viewing sites, or known caves of significance in the Decision Area. No rivers in the PA are currently managed under the Wild and Scenic Rivers Act of 1968. Indicators used to assess change to special designation areas are:

- Changes to administrative designations: consider changes to the number and type of areas, access to areas, and location of areas.
- Changes in availability of special areas in surrounding vicinity (outside Decision and PAs).

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Areas of Critical Environmental Concern are unique to the BLM. BLM regulations (43 CFR Part 1610) define an ACEC as an area “within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.” While an ACEC may emphasize one or more unique resources, other existing multiple-use management can continue

within an ACEC so long as the uses do not impair the values for which the ACEC was designated.

Laws, Regulations and Policies

Section 202(c)(3) of FLPMA mandates the BLM to give priority to the designation and protection of ACECs in the development and revision of land use plans. BLM Manual 1613 (USDI-BLM 1980a) describes the process followed to nominate ACECs and screen areas for their suitability or ACEC designation. The BLM’s planning regulations (43 CFR 1610.7-2) establish the process and procedural requirements for designating ACECs in RMPs and RMP amendments.

Existing ACECs

The 11,679-acre Sleeping Giant ACEC is adjacent to the Holter Lake Recreation Area complex and is primarily comprised of the Sleeping Giant WSA and Sheep Creek WSA (AMS Figure 2-26). The area is characterized by the same values discussed in the Wilderness Study Area section above.

NATIONAL TRAILS

Portions of the Continental Divide National Scenic Trail and the Lewis and Clark National Historic Trail are in the Decision Area. About 226 miles of the Continental Divide National Scenic Trail traverse the PA, less than three miles of which are located within the Decision Area. Approximately 210 miles of the Lewis and Clark National Historic Trail traverses the PA along the Missouri, Jefferson, Gallatin and Yellowstone Rivers, as well as a cross-county segment from Belgrade to Livingston. BLM manages about 34,000 acres of public land along this national trail in close cooperation with the public and other federal, state, and local agencies under the Missouri/Madison Comprehensive Recreation Plan. BLM provides multiple public interpretative services throughout this corridor including numerous site location signs, the self-guided Two Camp Vista facility on Hauser Lake and partnership contributions to the Gates-of-the-Mountains kiosks on Holter Lake.

WILD AND SCENIC RIVERS

No rivers in the Decision Area are currently managed under the Wild and Scenic Rivers Act of 1968 (Public

Law 90-542, as amended; 16 USC 1271-2287). The Wild and Scenic River Act was enacted by Congress to provide a national policy for preserving and protecting selected rivers and river segments in their free-flowing condition for the benefit and enjoyment of present and future generations. Section 5(d)(1) of the Act directs federal agencies to consider potential wild and scenic rivers in their land and water planning processes.

As part of the land use planning process for the Butte RMP, the BLM interdisciplinary team analyzed all river and stream segments in the PA that might be eligible for inclusion in the NWSRS. This included screening all PA rivers to identify those with BLM surface ownership. In addition, BLM coordinated with other federal and state river administering agencies and consulted applicable source listings such as the NPS Nationwide Rivers Inventory and the American Rivers Outstanding Rivers List. These initial screening and identification efforts resulted in a list of 164 rivers or river segments for further consideration in the inventory process.

Additional review focused on whether these 164 segments meet free-flowing criteria and contain any outstandingly remarkable values, as defined in the Wild and Scenic Rivers Act. Of the 164 river segments, four segments totaling 12 miles meet the eligibility criteria. These include segments on the Big Hole River, Missouri River, Moose Creek, and Muskrat Creek. Tentative classifications were assigned to each eligible segment as follows: Big Hole River – Recreational; Missouri River – Scenic; Moose Creek – Scenic; and Muskrat Creek – Scenic. See Map 32 and Appendix J – Wild and Scenic Rivers for additional information.

WILDERNESS AREAS

No BLM designated Wilderness Areas exist within the Decision Area. Portions of five Wilderness Areas administered by the USFS are located within the PA. No additional BLM lands other than Wilderness Study Areas described below have wilderness characteristics.

WILDERNESS STUDY AREAS

There are six existing Wilderness Study Areas in the Decision Area (AMS Figure 2-26 and Table 3-29). Under FLPMA, Congress directed BLM to inventory, study, and recommend public land under its administra-

Table 3-29 Wilderness Study Areas			
Name	Number	Total Acres	Acres Recommended for Wilderness
Humbug Spires	MT-ISA-003	11,320	9,648
Sleeping Giant	MT-075-111	6, 666	6,666
Sheep Creek	MT-075-11B	3,801	3,801
Black Sage	MT-075-115	5,917	5,917
Elkhorn Tack on	MT-075-114	3,575	3,575
Yellowstone River Island	MT-07-133	69	69

tion for wilderness characteristics. All Decision Area lands were inventoried for wilderness characteristics; no new lands acquired since the last wilderness review contain lands with wilderness characteristics. Section 603 of FLPMA requires the BLM to provide Congress with recommendations as to suitability or unsuitability of BLM Wilderness Study Areas (roadless areas greater than 5,000 acres and roadless islands) for Wilderness designation. Only Congress can ultimately decide which areas, if any, will be designated as Wilderness and added to the National Wilderness Preservation System.

Sleeping Giant

The Sleeping Giant WSA consists of 6,666 acres. It was originally established in 1981, removed from further wilderness consideration in 1982, reinstated as a WSA in 1985, and enlarged in 1988 (USDI-BLM 1991a). It has steep, irregular topography with elevations ranging from 3,600 to 6,800 feet and is adjacent to the Holter Lake Recreation Area complex. The Sleeping Giant formation

is a well-known landmark visible from Helena. About half the area is forested. Seven miles of ridgeline hiking routes offer panoramic views of the Rocky Mountains. A portion of the Sleeping Giant area is part of the Lewis and Clark National Historic Trail. Several deteriorating structures near the river evoke the lifestyles of early settlers (USDI-BLM 1991a).

The Wilderness suitability study recommended the Sleeping Giant for Wilderness designation (USDI-BLM 1991a); this has been forwarded to Congress. This area is managed under the Interim Management Guidelines.

Sheep Creek

Sheep Creek, a 3,801-acre WSA established in 1988, is immediately west of and adjacent to the Sleeping Giant WSA. The two areas are separated by a power line and associated maintenance road. Sheep Creek is characterized by steep topography with elevations ranging from 4,100 to 6,600 feet. About half the area is forested (USDI-BLM 1991a). The Wilderness suitability study recommended Sheep Creek for Wilderness designation (USDI-BLM 1991a). This WSA is being managed under the Interim Management Guidelines.

Black Sage

Black Sage is a 5,917-acre WSA established in 1981. All sides of the area are bordered by private land, and there is no legal public access. The area is characterized by rolling hills with elevations from 5,000 to 6,000 feet. Approximately 40 percent of the area is vegetated with juniper, mountain mahogany Douglas-fir and limber pine; the remainder is comprised of grasses and sagebrush. No perennial water sources occur in the area, and there are no dominant features except for a forested ridge face in the central portion of the area. The Wilderness suitability study and EIS recommended the area as

unsuitable for Wilderness designation (USDI-BLM 1986); this has been forwarded to Congress. This Wilderness Study Area is managed under the Interim Management Guidelines.

Elkhorn Tack-on

The Elkhorn Tack-on WSA was established in 1979. This WSA totals about 3,575 acres. The area is characterized by dense forests of lodgepole pine, Douglas-fir and ponderosa pine, three perennial streams and mountainous terrain (USDI-BLM *et al.* 1995). The BLM Elkhorn WSA is located immediately adjacent to the 64,522-acre Elkhorn Inventoried Roadless Area that is administered by the USFS. Because the portion located on BLM land is less than 5,000 acres, it is considered to be a Section 202 (FLPMA) tack-on to the USFS area. A Wilderness suitability study has not been completed. The Elkhorn WSA is being managed under the Interim Management Guidelines.

Yellowstone River Island

Established in 1981, the Yellowstone River Island WSA is comprised of 69 acres. The area is roughly circular and about two thirds of a mile in diameter; the surrounding river frontage is private. The island is a relatively flat sand and gravel bar that varies from zero to ten feet above the river's low-flow level; the average elevation is 4,415 feet. The island's outer portions consist of cut banks and alluvial deposits formed by a very active portion of the Yellowstone River and, consequently, are constantly subject to change. The majority of the river now flows north of the island, whereas 50 years ago the majority flowed south. Vegetation is diverse and consists of dense pioneer shrubs (primarily willows) around the perimeter. The higher and more stable interior comprises about half of the island and is vegetated with cottonwood stands intermixed with open, grassy areas. There are several high-water channels within the WSA, some of which support marshy riparian vegetation. The Wilderness suitability study and EIS recommended the area as unsuitable for Wilderness designation (USDI-BLM 1986); this has been forwarded to Congress. The Yellowstone River Island WSA is being managed under the Interim Management Guidelines. There are no size requirements for islands.

SOCIAL AND ECONOMIC

TRIBAL INTERESTS

Indian Trust Resources are legal interests in assets held in trust by the federal government for federally recognized Indian tribes or nations or for individual Indians. Tribal treaties are negotiated contracts executed with the United States and are on essentially the same legal footing as treaties with foreign nations. Since the BLM manages portions of the ceded lands that are within the traditional use areas of the tribes, the BLM has a trust re-

sponsibility to provide the conditions necessary for Indian tribal members to satisfy their treaty rights and consider the potential impacts of BLM plans, projects, programs, or activities. Members of the tribes may exercise their hunting, fishing, and gathering rights on federal lands outside the boundaries of the reservation. Tribal members may also access and use places or resources that are important for religious or cultural reasons. Effective consultation and coordination with the tribes is necessary to identify any management issues with trust resources, treaty rights, or traditional or religious uses.

PUBLIC SAFETY

Abandoned Mine Lands

Mine wastes from historic mine sites now considered to be abandoned mine lands are a threat to human health and the environment. Abandoned mines also contain hazardous mine openings (HMOs) and physical safety hazards associated with historic mine operations and unstable slopes. Heavy metals associated with mine waste may pose a risk to human recreational users and to terrestrial and aquatic environments.

Old mine workings are found throughout Montana on land administered by BLM, USFS, and the State of Montana as well as on private land patented under the General Mining Law. Laws requiring the clean-up and proper closure of mines are relatively recent compared to this long history of mining law.

AMLs are inactive or abandoned mines located on or near public land where the owner or operator cannot be established, have no financial assets, or cannot assist with the reclamation of these mine sites. Mine waste present at abandoned or inactive mine sites generally include waste rock, mill tailings, and chemicals. Mine waste produced from the extraction or beneficiation of ore is considered exempt from hazardous waste regulations. The reclamation or clean-up of AML sites is often

the responsibility of public land management agencies if an owner or operator of the AML site can not be determined.

The BLM began inventorying AML sites in 1993 and continues to inventory, assess, and add to the existing AML inventory data as new sites are identified. The AML inventory data is used to assist with the prioritization, funding, and continued reclamation of AML sites. AML sites identified in the inventory include those on or potentially impacting BLM lands and may range from small, insignificant sites to larger environmental or HMO sites. Some areas have not been inventoried and new HMOs are reported every year by BLM employees or the public. The BFO has reclaimed 11 abandoned mine sites considered to be a threat to human health and the environment because of water quality related issues on BLM lands since the beginning of the AML program in 1997. A total of 49 HMOs considered to be physical safety hazards have been reclaimed. Twenty-seven HMOs are presently being assessed, and 51 are scheduled for reclamation over the next five years. It is expected that up to 100 HMOs with associated physical safety problems may need to be assessed and reclaimed in the Decision Area during the next 20 years.

Hazardous Materials

Improper handling, storage, and disposal of hazardous material may pose a risk to recreational users and to terrestrial and aquatic environments (**Table 3-30**). Hazardous materials may legitimately be brought onto BLM land during weed control or resource development activities. The types of hazardous materials used for weed and insect control include herbicides and pesticides. The general types of hazardous materials that may be present during natural resource management include petroleum products (fuels and lubricants), solvents, surfactants, paints, explosives, batteries, acids, biocides, gases, antifreeze, and mineral products (mine waste, cement, and drilling materials).

Table 3-30
Activities and Associated Hazardous Materials

Potential Hazard	Examples
Hazardous materials associated with historic and active mine operations	Acid rock drainage; Chemicals associated with processing ore or used in laboratories (i.e., cyanide); Explosives such as dynamite, ammonium nitrate, caps, and boosters; Heavy metals; Asbestos
Military operation	Unexploded ordinances; Aircraft wreckage
Illegal dumping	Unauthorized landfills; Dumping of barrels or other containers with hazardous substances on public land
Illegal activities	Drug Labs; Wire burn sites
Spillage of hazardous materials	Materials spilled from overturned trucks or train cars
Oil and gas activities	Hydrogen sulfide gas; Oil spills
Facilities on public land, either federal or private (under a right-of-way)	Leaky underground storage tanks; Asbestos

SOCIAL AND ECONOMIC ENVIRONMENT

The Butte FO manages lands distributed across eight contiguous counties. Potential social and economic effects associated with the draft RMP include changes in employment, income, and quality of life. These effects are likely to occur primarily in Jefferson, Broadwater, Lewis and Clark, and Silver Bow counties where the majority of PA lands are located. Although the effects are likely to be relatively small in Beaverhead, Deer Lodge, Gallatin, and Park counties, these counties are also included in the following discussion.

The following sections present a general overview of the social and economic conditions of the eight study area counties and provide a baseline that the potential effects of the alternatives may be measured against. The discussion is organized into two main sections that address social conditions and economic conditions, respectively.

Social Conditions

Social Trends

This section provides a brief overview of general social trends and changing attitudes toward public land management in western Montana.

The population in the eight county study area increased by 17 percent in the 1990s, compared to a 13 percent increase statewide, with net in-migration accounting for 72 percent of total growth in the study area counties. This is generally representative of the broader movement of people from urban areas to rural areas in western Montana that has been going on since the 1980s. In scenic areas, particularly those suitable for recreation, ranches are being sold for recreation uses or subdivided for homes. Some in-migrants buy smaller lots to ranch or farm but do not depend on economic return from the property as their primary source of income. Sometimes this in-migration has resulted in conflict between long-time rural residents and newcomers whose beliefs and values may challenge the existing way of life (USDI-BLM 2004j).

Social values associated with land and natural resources take many forms including commodity, amenity, environmental, ecological, recreation, spiritual, health, and security-related values (Stankey and Clark 1991). In the past, natural resource management has tended to emphasize commodity values. This emphasis has come into question in recent years and changing public attitudes toward the management of public lands and an increased emphasis on environmental protection have raised concerns in some parts of the West. Some groups have expressed concerns that changes in public land management are being driven by government officials and environmental advocates who do not have a true understanding of these lands or the people living nearby who depend on these lands for their livelihood and recreation. There is particular concern about the loss of traditional

uses of the land such as livestock grazing and cross-country vehicle use (USDI-BLM 2004j).

Comments received during the Butte RMP scoping process expressed concern over the cumulative loss of public land to private ownership and the loss of public access to public lands through access closures. Concerns were also expressed that access to public land has already been reduced by land exchanges and land pooling processes (USDI-BLM 2005b).

Demographic Characteristics and Trends

Population

The eight-county study area had a total population of 206,900 in 2000, with county populations ranging from 4,385 in Broadwater County to 67,831 in Gallatin County. Major cities in the study area include Bozeman and Helena, with 2000 populations of 27,509 and 25,780, respectively. Butte is also a major city and regional center.

Montana is one of the least densely populated states in the country, with an average population density of 6.2 persons/mi² compared to a national average of 79.6 persons/mi². The eight-county study area had an average population density of 11.1 persons per square mile, with county population densities ranging from 1.7 persons per square mile in Beaverhead County to 48.2 persons per square mile in Silver Bow County.

Total population increased in seven of the eight study area counties in the 1990s, with the largest increases occurring in Gallatin (34 percent), Broadwater (32 percent), and Jefferson (27 percent) counties. The population in Silver Bow County, in contrast, increased by just 2 percent over this period, while Deer Lodge County experienced a net decrease in population. Much of the overall increase in population was due to net in-migration, with increases tending to occur primarily in unincorporated areas in most counties (MDOC 2004a).

Population projections developed by the State of Montana in 1997 anticipate continued population growth through 2010 in all of the study area counties, with the exception of Deer Lodge and Silver Bow counties where population is expected to decrease by about 6.6 and 6.4 percent, respectively. Population is expected to grow particularly rapidly between 2000 and 2010 in Jefferson (22 percent), Gallatin (18.6 percent), Broadwater (17.2 percent), and Lewis and Clark (15.2 percent) counties. Population growth is projected for all study area counties from 2010 to 2020, with total population in the eight-county area projected to increase by 11.8 percent (MDOC 2004b).

Race and Ethnicity

Approximately 89.5 percent of Montana's population identified as White in the 2000 census. American Indian and Alaska Natives were the largest minority group accounting for 6 percent of the total state population. All

eight study area counties had predominantly white populations, with more than 94.7 percent of the total study area population identifying as White in the 2000 census. Hispanics/Latinos were the largest minority population accounting for 1.8 percent of the total study area population (**Table 3-31**).

Income and Poverty

Per capita income, which is calculated by dividing total personal income by population, was lower than the

statewide average in five of the eight study area counties in 2000, ranging from 83 percent to 99 percent of the state average in Broadwater and Silver Bow counties, respectively (**Table 3-32**). Per capita income in the remaining three counties ranged from 109 percent to 112 percent of the state average in Gallatin and Lewis and Clark counties, respectively.

The percent of the population below the poverty rate in 1999 was below the state average (14.6 percent) in five of the eight study area counties, ranging from 9.0 per

Table 3-31
Race and Ethnicity, 2000

County/State	2000 Population	Percent of Total Population					
		White	Black/African American	American Indian/Alaska Native	Other Race ¹	Two or More Races	Hispanic/Latino Origin
Beaverhead	9,202	94.4	0.1	1.4	0.3	1.1	2.7
Broadwater*	4,385	96.1	0.3	1.1	0.2	1.0	1.3
Deer Lodge	9,417	94.7	0.2	1.6	0.4	1.5	1.6
Gallatin	67,831	95.3	0.2	0.8	1.0	1.1	1.5
Jefferson*	10,049	95.2	0.1	1.2	0.5	1.5	1.5
Lewis and Clark*	55,716	94.4	0.2	1.9	0.6	1.4	1.5
Park	15,694	95.5	0.4	0.9	0.4	1.0	1.8
Silver Bow*	34,606	93.7	0.1	1.8	0.5	1.1	2.7
County Total	206,900	94.7	0.2	1.4	0.7	1.2	1.8
Montana	902,195	89.5	0.3	6.0	0.6	1.5	2.0

*RMP-related effects are most likely to occur in these counties, where the majority of the PA lands are located.

¹ The "Other Race" category presented here includes census respondents identifying as Asian, Native Hawaiian and Other Pacific Islander or Some Other Race.

Source: Social Science Data Analysis Network, 2004

Table 3-32
Per Capita Income by County, 1990 and 2000

County/ State	Per Capita Income		Share of Per Capita Income ¹					
			Earnings		Transfer Payments		Dividends, Interest and Rent	
	2000 (\$)	% of State Average	% of Total	Change 1990-2000	% of Total	Change 1990-2000	% of Total	Change 1990-2000
Beaverhead	21,175	92	55	-1	19	1	26	0
Broadwater*	19,038	83	55	0	21	2	24	-2
Deer Lodge	19,641	86	51	2	26	-1	22	-1
Gallatin	25,139	109	66	4	9	-3	25	-2
Jefferson*	25,476	111	69	-2	12	0	19	2
Lewis and Clark*	25,623	112	55	-1	19	1	26	0
Park	20,469	89	53	3	18	-3	29	0
Silver Bow*	22,760	99	59	3	20	-1	21	-2
Montana	22,961	100	60	-1	19	1	26	0

*RMP-related effects are most likely to occur in these counties, where the majority of the PA lands are located.

¹ Personal income consists of net earnings by place of residence, transfer payments (including income maintenance payments, unemployment, and retirement benefits), and dividends, interest, and rent.

Source: U.S. Bureau of Economic Analysis, 2003a

cent in Jefferson County to 12.8 percent in Gallatin County.

The percent of the population below the poverty rate in the remaining three counties ranged from 14.9 percent to 17.1 percent in Silver Bow and Beaverhead Counties, respectively (Table 3-33).

Table 3-33 Percentage of Persons Below Poverty by County, 1999	
County	Individuals Below Poverty Level
Beaverhead	17.1%
Broadwater*	10.8%
Deer Lodge	15.8%
Gallatin	12.8%
Jefferson*	9.0%
Lewis and Clark*	10.9%
Park	11.4%
Silver Bow*	14.9%
Montana	14.6%

*RMP-related effects are most likely to occur in these counties, where the majority of PA lands are located.

Source: U.S. Census Bureau, 2004a

Affected Counties

The following paragraphs provide a brief overview of the social and economic conditions in Broadwater, Jefferson, Lewis and Clark, and Silver Bow counties where the majority of the effects are expected to occur.

Broadwater County

Broadwater County has faced substantial growth since the 1980s. Growth pressures from Helena in adjacent Lewis and Clark County have affected the north end of the County, with growth in Three Forks/Gallatin County affecting the south portion of the county (Broadwater County Planning Board 2003).

The population in Broadwater County increased by 32 percent between 1990 and 2000 - the third highest increase in Montana. Much of this increase occurred in unincorporated areas, primarily on marginally productive agricultural land. Many new residents are attracted to communities with appealing environments and life styles. Long-term residents typically want to avoid increasing the current cost of building and living in the area (Broadwater County Planning Board 2003).

A scoping meeting for the Butte RMP was held in Townsend. Comments made during this meeting were largely concerned with weeds.

Jefferson County

Although historically important traditional resource-based industries—mining and ranching—continue to play an important role in Jefferson County's local economy, new residents are also attracted to the convenient location and scenic beauty of the area. Jefferson County

identifies itself as the “undiscovered in-between”, located between Butte and Bozeman and between Butte and Helena (Northern Economics 2003). Recent economic trends influencing the county include the influx of population and development spilling over from Helena into the north part of the county and the decrease in employment in the Golden Sunlight Mine in the south part of the county (Northern Economics 2003).

A scoping meeting for the Butte RMP was held in Boulder. Comments made during this meeting were concerned with grazing and fire/fuels management.

Lewis and Clark County

The economy of Lewis and Clark County is mainly based on government employment and services, with services emerging as an increasingly important component of the overall employment mix. Lewis and Clark County and the Helena/East Helena area, in particular, serve as an important regional center, with many workers commuting to work there from Jefferson and Broadwater counties. The Helena Valley continues to account for much of the total County population and growth, with the majority of recent and ongoing growth occurring within unincorporated areas in the valley (Lewis and Clark County Planning Department 2004).

A scoping meeting for the Butte RMP was held in Helena. Comments made during this meeting were largely focused on issues surrounding access to public lands and land ownership adjustments. Weed management and fuel management policies were also identified as areas of concern.

Silver Bow County

The Butte-Silver Bow area is rich in mineral resources and the area's colorful mining history has shaped almost all aspects of life in Butte-Silver Bow County. Population in Butte-Silver Bow has declined from a high of 60,313 in 1920 to just 34,606 in 2000. The social assessment prepared for the Beaverhead-Deerlodge National Forest planning process noted that Butte is currently in transition from being a one-company, working class, mining town, but does not appear to have identified a clear vision for its future. Butte is extremely pro-recreation and has a long history of conservation efforts (Northern Economics 2003).

Scoping meetings for the Butte RMP revision were held in Butte and Divide. Comments made during the Butte meeting were largely focused on issues surrounding access to public lands and land exchanges. Comments made in Divide, a small community located on the south edge of the county, were primarily concerned with potential impacts to grazing and the trade-off between environmental preservation and grazing rights.

Affected Groups

There are a number of different groups that could be potentially affected by the draft RMP. These groups may

be generally identified by their shared lifestyles and values. Lifestyle, as used here, may be broadly described as a combination of the activities, values, meanings, preferences, and ways of living in a particular place and time. Potentially affected groups include those associated with ranching, timber, and recreation, as well as permitted outfitters and guides, groups who give a high priority to resource protection, and groups who give a high priority to resource use.

The following brief discussions simplify what are often quite complex and unique values and attitudes and the groupings presented here are by no means mutually exclusive, with many ranchers, for example, also participating in recreation activities. It is also worth noting that personal attitudes, interests, and values often change over time.

Ranching

Ranching is an important part of the history, culture, and economy of the eight study area counties. Many ranchers in southwest Montana consider their work a “way of life”, rather than simply a source of income (Northern Economics 2003). The land and their relationship to it is an important part of how they construct and evaluate their own identities, as well as those of their neighbors. Ranchers face many challenges today, including fluctuating cattle prices, increasing equipment and operating costs, and changes in federal regulations. Additional sources of income are often necessary to continue ranching and ranchers or their family members may also work as fishing guides or outfitters or elsewhere in town (Northern Economics 2003). There are currently 174 ranchers who lease Butte Field Office lands for grazing. For 20 of these ranch operations, the BLM lands account for more than one-third of their total AUMs.

Comments expressed during scoping for the Butte RMP included concerns about current livestock grazing and vegetation management programs, with comments stating that these programs are poorly managed and detrimental to vegetation, wildlife, foliage, and soil conditions. Other comments favored livestock grazing on public lands and improving forage for livestock, as well as wildlife. Others recommended that livestock grazing management be aimed at maintaining a sustainable grazing program that protects range and riparian resources, water quality, and fisheries (USDI-BLM 2005b).

Timber and Logging

Loggers typically have a strong sense of occupational identity that is tied to their lifestyle and the natural environment that they work in and believe they understand well. The loss of a job for a logger typically involves a change in a valued way of life, as well as the loss of a paycheck. Reductions in timber harvest on area national forests have generated considerable controversy between loggers, mill workers, and timber industry representatives on the one hand and other groups who argue that

forests have other economic values, such as recreation and amenity values.

Timber employment is concentrated in only a few areas in the eight-county study area and lands managed by the Butte FO account for a very small portion of total harvest in this area. Timber related issue, raised during public scoping for this plan, included concerns regarding noxious weeds, fuel hazard reduction, and deal tree salvage.

Recreationists

The recreation opportunities available in the eight-county study area play an important role in the quality of life of many local residents, as well as attracting visitors from elsewhere in the state and further afield. Many people have moved to the area or choose to stay in the area because of these recreation opportunities. Popular recreation activities in the PA include big game hunting; upland bird and waterfowl hunting; fishing; mountain and road biking; camping, backpacking, and horsepacking; river rafting, canoeing and kayaking; swimming; lake boating; downhill skiing and snowmobiling, OHV use; picnicking; archery; gathering organic materials; organized festivals; and viewing wildlife and landscapes.

These activities involve diverse groups of people and changes in recreation management can affect people who engage in particular recreation activities very differently. Recreationists tend to organize into interest groups. The Capital Trail Vehicle Association, which is primarily concerned with OHV use, accounted for approximately 58 percent of the comments received during the public scoping process for the Butte RMP (319 of 554 comments). As a result, the majority of the comments received on recreation were primarily concerned with OHV use. Concerns were expressed that demand for motorized recreational access has increased in recent years, while motorized access has decreased, largely as a result of federal land management action and policies that favor non-motorized users. Some commenting felt that public lands should be available to all users, both motorized and non-motorized, but some areas and trails should have limited types of use (hiking use only or OHV use only) where different types of use tend to be incompatible.

Others felt that non-motorized uses are presently favored over motorized uses and felt that this balance should be changed, with motorized users allowed equal access (USDI-BLM 2005b).

Permitted Outfitters and Guides

The Butte FO authorized 19 Special Recreation Use Permits in Fiscal Year (FY) 2003. The primary activity for 13 of the Special Recreation Permits is big game hunting, with most big game hunting outfitter/guides pursuing bear in the fall and mountain lion in the winter. Special Recreation Use Permits are also issued for rock climbing in the Humbug Spires SRMA, with restrictions

that typically limit the activity to weekdays, so the general public can enjoy the resource on weekends without over-crowding (Rixford 2004). The Pipestone area is available for organized motorized vehicle events which require a permit (Rixford 2004). One person commenting during scoping requested that outfitters be able to take camping/river trips along the Big Hole River.

Individuals and Groups who give a High Priority to Resource Protection

A number of individuals and groups commenting during scoping for the Butte RMP expressed concern about resource protection issues, with particular emphasis placed on wildlife, fisheries, water issues, and special area designations. Comments included requests that habitat corridors for threatened, endangered, and sensitive species and the integrity and un-motorized character of all roadless areas be maintained. One person commenting recommended that the BLM identify impaired streams and implement restoration measures to support native fisheries. Water-related concerns included maintenance of hydrological and aquatic species goals, restoration of watershed health, and protection of riparian and wetland habitat and aquatic species. Many respondents identified areas for designation as special use areas. Areas identified included areas of critical environmental

concern, wild and scenic river areas, recreational river areas, and wilderness study areas (USDI-BLM 2005b).

Individuals and Groups who give a High Priority to Resource Use

A number of individuals and groups expressed concern about limitations being placed on the availability of public lands for commercial uses such as livestock grazing, mineral development, and timber harvest. These people believe that local communities depend on these industries, which are a primary source of high paying jobs to local economies. Comments received during scoping for this project requested that the RMP revision focus on beneficial economic and social use of public lands, not locking them up from development or public access. Some commenting indicated that they support protection of water, aquatic species, and wildlife, but not to the point that it resulted in detrimental effects to the local economy, lifestyle, access to public lands, and the development of public lands (USDI-BLM 2005b).

Economic Conditions

Employment and Income

There were a total of approximately 135,200 full- and part-time jobs in the eight-county study area in 2000 (Table 3-34).

Table 3-34
Study Area Employment by Sector, 1990 and 2000

	Total Employment		Share of Total (Percent)		1990-2000	
	1990	2000	1990	2000	Absolute Change	Percent Change
Total full-time and part-time employment ¹	98,044	135,231	100	100	37,187	38
By Type						
Wage and salary employment	75,511	102,817	77	76	27,306	36
Proprietors employment	22,533	32,414	23	24	9,881	44
By Industry²						
Farm employment	3,755	4,204	4	3	449	12
Nonfarm employment	94,289	131,027	96	97	36,738	39
Ag. services, forestry, fishing and other	981	2,103	1	2	1,122	114
Mining	978	1,097	1	1	119	12
Construction	3,607	9,520	4	7	5,913	164
Manufacturing	4,565	6,402	5	5	1,837	40
Transportation and public utilities	4,579	5,303	5	4	724	16
Wholesale trade	2,881	3,925	3	3	1,044	36
Retail trade	18,206	26,399	19	20	8,193	45
Finance, insurance, and real estate	6,604	9,365	7	7	2,761	42
Services	28,083	42,115	29	31	14,032	50
Government and government enterprises	22,172	24,404	23	18	2,232	10
Federal, civilian	2,857	2,831	3	2	-26	-1
Military	1,400	1,125	1	1	-275	-20
State and local	17,915	20,448	18	15	2,533	14

¹ These figures, which are annual averages, include self-employed individuals, and full- and part-time jobs, with each job that a person holds counted at full weight.

² Totals by industry sector do not sum to the nonfarm employment total because actual numbers of jobs are not disclosed in some sectors in some counties to avoid disclosure of confidential information. Estimates for these items are, however, included in the totals. Source: U.S. Bureau of Economic Analysis, 2003b

The number of jobs increased by approximately 38 percent in the 1990s, with the largest increases occurring in the services, retail trade, and construction sectors. Employment increased in all sectors with the exception of the federal government sector, which experienced net job loss (**Table 3-34**). Employment increased in all eight counties over this period, with the largest increase (61 percent) occurring in Gallatin County. Gallatin County had the largest number of jobs in 2000 (51,661), followed by Lewis and Clark (38,839) and Silver Bow (18,988) counties (U.S. Bureau of Economic Analysis 2003b).

Annual average unemployment rates in the study area in 2003 ranged from 2.8 percent in Gallatin County to 6.5 percent in Deer Lodge County compared to a statewide average of 4.7 percent. Unemployment rates also exceeded the state annual average in Silver Bow (5.1 percent) and Broadwater (4.9 percent) counties (Montana Department of Labor and Industry 2004a).

BLM Contributions to Area Economic Activity

Butte Field Office operations and management make a direct contribution to area economic activity by employing people who reside in the area and by expending operations dollars. Management of BLM administered public lands and minerals is provided by a professional and administrative staff of about 60 permanent and other than permanent employees who are located in Butte. BLM expenditures in FY 2007 were about \$3.6 million for labor and \$4.3 million for operations (BLM, MIS, 2008). The response coefficients shown in **Table 3-35** indicate how total local employment and total local labor income respond to a \$1000 change in local BLM expenditures.

Table 3-35 Response Coefficients Associated with BLM Employment and Non-salary Expenditures			
Economic Sector	Units	Total Employment (jobs/M units)	Total Labor Income (\$/M units)
BLM salaries	\$	0.04	1,220
BLM Non-salary Expenditure	\$	0.01	330

Source: IMPLAN, 2007

Potentially Affected Industries

The following paragraphs provide an overview of the industries that could be affected by the draft RMP: forest products, recreation and tourism, agriculture, and mining.

The land managed by the Butte FO, approximately 311,000 acres, is distributed across eight large counties, and comprises just 2.6 percent of the total land area in these counties. As a result, the contribution of activities on Butte FO land to the economies of these counties is relatively small. This contribution may, however, be very important at the community level and especially for individuals who make all or part of their living from activities on or related to this land.

Total BLM management and land uses on BLM lands contribute less than one percent to employment and labor income in the local economy.

Table 3-36 displays the BLM-related contributions to the local economy by industry.

Table 3-36 Current Role of BLM-Related Contributions to the Area Economy				
Industry	Employment (jobs)		Labor Income (Thousands of 2007 dollars)	
	Area Totals	BLM-Related	Area Totals	BLM-Related
Agriculture	4,441	78	\$89,671.1	\$1,795
Mining	1,487	23	\$132,836.1	\$1,496
Utilities	853	3	\$84,585.0	\$291
Construction	15,285	6	\$583,224.8	\$212
Manufacturing	5,704	39	\$230,657.7	\$1,177
Wholesale Trade	3,428	41	\$151,399.2	\$1,784
Transportation & Warehousing	3,717	26	\$146,698.4	\$965
Retail Trade	19,665	140	\$486,642.8	\$3,234
Information	2,416	6	\$129,140.8	\$283
Finance & Insurance	6,029	16	\$244,346.8	\$628
Real Estate & Rental & Leasing	7,287	19	\$238,873.3	\$592
Prof, Scientific, & Tech Services	11,396	22	\$485,902.7	\$785
Management of Companies	734	5	\$23,004.5	\$141
Admin, Waste Management & Rem. Svc.	4,968	14	\$102,256.1	\$297

Table 3-36				
Current Role of BLM-Related Contributions to the Area Economy				
Industry	Employment (jobs)		Labor Income (Thousands of 2007 dollars)	
	Area Totals	BLM-Related	Area Totals	BLM-Related
Educational Services	1,989	7	\$33,454.6	\$114
Health Care & Social Assistance	13,923	45	\$519,350.4	\$1,755
Arts, Entertainment, and Rec	4,530	59	\$62,651.3	\$977
Accommodation & Food Services	14,053	345	\$211,445.5	\$5,171
Other Services	9,196	41	\$171,101.1	\$696
Government	25,311	259	\$1,433,467.6	\$11,506
Total	156,415	1,193	5,560,710	33,898
BLM as Percent of Total	---	0.76%	---	0.61%

Source: IMPLAN/FEAST, 2007

Table 3-37 displays the employment and labor income by major BLM program area.

Table 3-37		
Local Employment and Income by BLM Program Area		
BLM Program Area	Total Number of Jobs Contributed	Labor Income (\$1,000)
Recreation	510	\$13,073.6
Wildlife and Fish	292	\$7,549.9
Grazing	11	\$197.9
Timber	106	\$2,999.9
Minerals	32	\$1,290.6
Ecosystem Restoration	10	\$335.6
Payments to States/Counties	144	\$5,563.3
BLM Expenditures	89	\$2,887.8
Total BLM Management	1,193	\$33,898.5

Source: IMPLAN/FEAST, 2007

Forest Products

Lumber and wood products accounted for approximately 1.7 percent of total covered employment in Montana in 2001. Lumber and wood products employment in the six study area counties where data are available ranged from 0.1 percent of total covered employment in Silver Bow County to 1.2 percent in Jefferson County (Montana Department of Labor and Industry 2004). Although data were withheld for Broadwater County, wood products play an important role in the county economy, employing 260 people in 2000, approximately 12 percent of total full- and part-time employment (Broadwater County Planning Department 2003).

Data compiled by the University of Montana's Bureau of Business and Economic Research (BBER), indicate

that there were a total of 44 forest products facilities in the eight study area counties in 1998.

These facilities included lumber mills, log home and log furniture manufacturers, and post and pole facilities, with log home facilities and lumber mills accounting for 36 percent and 32 percent of the total, respectively (BBER 2001).

Eighteen of these facilities were located in Gallatin County. Jefferson and Park counties accounted for six facilities each. Beaverhead and Lewis and Clark counties each accounted for five facilities. Two facilities were located in Broadwater County.

Annual harvest data, available at 5 year intervals, indicate that total timber harvest in the eight-county study area has decreased from a high of 113 million board feet (MMBF) in 1976 to just 61 MMBF in 1998. Much of this decline is a result of reductions in timber harvest on area national forests. Lewis and Clark County accounted for nearly half of the total harvest in the eight-county area in 1998 (BBER 2001).

Harvest from land managed by the Butte FO has fluctuated from year-to-year over the past two decades, at times quite dramatically. Harvest levels ranged from 33 thousand board feet (MBF) in 1995 to 1,683 MBF in 2001 (USDI-BLM 2004h).

Harvest from land managed by the Butte FO comprised less than 1 percent of total harvest from the eight-county area in 1987, 1992, and 1998, the years that total harvest data are available.

The relationship between harvest from BLM lands and the local economy is complicated by the fact that in 1998 eight counties, none of them in the study area, received more than 80 percent of all timber harvested in Montana. More than half of the total timber harvested in Lewis and Clark County in 1998 was, for example, processed outside the eight-county study area (BBER 2001). While the forest products sector accounts for a relatively small share of local employment, this employment is, of course, very important for the individu-

als involved. Employment in the forest products sector is relatively well paid. The average annual salary for the lumber and wood products sector in Montana was \$32,797 in 2001, compared to an average annual state salary of \$25,194 (Montana Department of Labor and Industry 2004b). Employment in the forestry and logging sector is, however, often seasonal or part-time and workers are often self-employed.

The response coefficients shown in **Table 3-38** indicate how total employment and total labor income respond to a MMCF change in local production for the economic sectors associated with timber management.

Table 3-38 Response Coefficients Associated with Timber Management			
Economic Sector	Units	Total Employment (jobs/MMCF)	Total Labor Income (M\$/MMCF)
Logging	CF	55	1,460
Sawmills	CF	51	1,610
Total	CF	106	3,070

Source: IMPLAN, 2007

Recreation and Tourism

Nonresident visits to Montana increased by approximately 27 percent or 2 million during the 1990s, increasing from about 7.5 million in 1991 to 9.5 million in 2001, with an estimated 9.7 million nonresident visits to the state in 2003 (The University of Montana, Institute for Tourism and Recreation Research [ITRR], 2002; 2004). Visitation data are not compiled at the county level, but it seems reasonable to assume that visitation to the eight counties also increased over this period.

Recreation and tourism is not classified or measured as a standard industrial category and therefore, employment and income data are not specifically collected for this sector. Components of recreation and tourism activities are instead captured in other industrial sectors, primarily the retail sales and services sectors. The contribution of travel and tourism to a local economy may, however, be estimated by assigning all or a portion of employment in other sectors to visitors. Using ratios developed for Missoula County (Ellard et al. 1999), travel-related, covered employment ranges from approximately 3.2 percent of total covered employment in Jefferson County to approximately 14.3 percent in Park County, compared to a statewide average of 7.2 percent (**Table 3-39**).

Employment in the recreation and tourism sector tends to be seasonal and relatively low paid, with a high proportion of the labor force self-employed. The travel related employment estimates presented in **Table 3-39**

Table 3-39 Travel Related Employment, 2001		
	Estimated Travel-Related Employment	% of Total Employment
Beaverhead	329	9.9
Broadwater*	55	4.9
Deer Lodge	298	9.5
Gallatin	3,422	9.8
Jefferson*	69	3.2
Lewis & Clark*	1,550	5.4
Park	747	14.3
Silver Bow*	1,117	8.1
Montana	27,706	7.2

* RMP-related effects are most likely to occur in these counties, where the majority of the PA lands are located.

1. Travel-related estimates and total employment data are based on ES-202 data compiled by the Montana Department of Labor and Industry. These data are a count of workers on the payrolls of business, nonprofit, and government establishments who are subject to Montana's unemployment insurance laws. Self-employed workers are included in these totals on a voluntary basis only. These data result in lower employment totals than the full- and part-time estimates developed by the U.S. Bureau of Economic Analysis.

2. Travel-related employment estimates were developed by assigning a portion of total employment in travel-related sectors to nonresidents using ratios from Ellard et al. (1999). Ellard et al.'s ratios were developed specifically for Missoula County based on national ratios and local business data. The application of these ratios to the eight study counties and the resulting estimates presented here should, as a result, be treated with caution and are provided only to give a general indication of the relative importance of travel-related employment to the eight area counties.

Sources: Ellard et al. 1999; Montana Department of Labor and Industry 2004b.

are based on shares of four SIC sectors: auto dealers and service stations, eating and drinking, hotels and lodging, and amusement and recreation services. The annual average salaries in these sectors in 2001 were \$22,833, \$9,399, \$12,931, and \$12,254, respectively, compared to an average annual state salary of \$25,194 (Montana Department of Labor and Industry 2004b).

The general estimates presented in **Table 3-39** provide some indication of the relative importance of travel-related employment by county, but it is important to note that not all of this employment is directly attributable to recreation use on land in the Butte PA. There are a number of other important recreation areas and attractions located within or in close proximity to the eight counties. Most of the travel-related employment in Park County, for example, where land managed by the Butte FO comprises just 0.4 percent of the county land area, is likely related to the county's proximity to Yellowstone National Park.

The response coefficients shown in **Table 3-40** estimate how total employment and total labor income respond to changes in recreation use for the economic sectors associated with recreation use.

Agriculture

The Census of Agriculture indicated that the eight-county study area had 2,801 farms and ranches in 1997, with nearly 60 percent of these engaged in cattle produc-

tion. Beaverhead County is Montana's largest cattle producer and accounted for approximately 40 percent of total cattle production in the eight-county area in 1997. Sheep and lambs are also produced in the area with about 416,000 head and 1,981 farms. Farmland comprised approximately 38 percent of the total eight-county area, compared to 63 percent statewide. The percent of farmland by county ranged from 22 percent of Deer Lodge and Silver Bow counties to 59 percent of Broadwater County (**Table 3-41**).

The overall market value of agricultural products sold in the eight-county area in 1997 was about \$190 million, with crops and livestock accounting for 37 percent and 63 percent of this total, respectively. Cattle and calves were the main livestock produced in the area, accounting for 53 percent of all agricultural products sold by value. Cattle and calves ranged from 31 percent of agricultural products sold by value in Broadwater County to 89 percent in Silver Bow County.

Farms in the eight-county area provided about 4,000 jobs in 2001, approximately 3 percent of total employment, compared to 5 percent statewide. Agricultural employment was relatively more important in Broadwater and Beaverhead counties, accounting for approximately 15 percent and 13 percent of total full- and part-time employment in 2001, respectively. Agricultural employment accounted for less than 5 percent of total employment in four of the remaining six counties: Sil-

Table 3-40			
Response Coefficients Associated with Recreation Use			
Type of Recreation Use	Units	Total Employment (jobs/M units)	Total Labor Income (\$/M units)
Day Use	Visits	0.32	8,500
Non-local Overnight	Visits	1.57	38,400
Local Overnight	Visits	0.86	23,700

Source: Averaged from response coefficients from IMPLAN, 2007

Table 3-41				
Number of Farms and Average Farm Size by County, 1997				
	Number of Farms	Land in Farms (acres)	% of Total County Area	Average Farm Size (acres)
Beaverhead	360	1,152,008	32	3,200
Broadwater*	219	452,744	59	2,067
Deer Lodge	83	101,657	22	1,225
Gallatin	835	759,944	46	910
Jefferson*	266	364,153	34	1,369
Lewis and Clark*	502	822,066	37	1,638
Park	420	749,103	42	1,784
Silver Bow*	116	100,181	22	864
Study Area Total	2,801	4,501,856	38	1,607
Montana	24,279	58,607,778	63	2,414

*RMP-related effects are most likely to occur in these counties, where the majority of the PA lands are located.

Source: U.S. Department of Agriculture, 1999

ver Bow (1 percent), Gallatin (2 percent), Lewis and Clark (2 percent), and Deer Lodge (3 percent). Employment in the agricultural sector is often seasonal or part-time and workers are often self-employed.

Grazing fees and BLM allotments are measured in terms of animal unit months (AUMs). For a cattle operation, an animal unit (AU) is defined as one cow with a nursing calf or its equivalent. An AUM is the amount of forage needed to sustain that cow and calf for one month. AUMs are authorized by the BLM on an annual basis. Data from the Butte FO indicate that the total number of cattle grazing in the eight county study area has fluctuated over the last decade, ranging from approximately 219,000 in 1996 to about 188,000 in 2003 and falling below 200,000 for the first time in 2002 (USDI-BLM 2004c). Total AUMs in the eight county study area and AUMs authorized by the Butte FO vary from year-to-year.

Total AUMs over the last decade ranged from 2.25 million in 2003 to 2.63 million in 1996. Grazing on Butte FO-managed land in the eight-county area currently involves 185 livestock operators grazing on 385 separate allotments.

In Fiscal Year 2005, livestock grazing on BLM lands involved livestock operators who had 101 Section 3 grazing permits (i.e. grazing on public lands within grazing districts, BLM Manual 1373.12 (USDI-BLM 1980b)) and 84 Section 15 grazing leases (grazing on public lands outside of grazing districts). Fifty percent of revenues from Section 15 grazing fees on public domain lands are distributed to the state and counties; 12.5 percent of grazing fees from Section 3 leases are distributed to the state and counties. The combined total (Section 3 and Section 15) number of active AUMs in FY05 was 23,585 AUMs.

Of the estimated 2,250,000 AUMs in the eight-county area in 2003, with approximately 13,600 or 0.6 percent

of the total are provided by land managed by the Butte FO (Table 3-42).

AUMs on land managed by the Butte FO ranged from 0.02 percent of total AUMs in Broadwater County to 2.7 percent of the total in Jefferson County. The majority of the AUMs in the PA are located in Broadwater (30 percent), Jefferson (30 percent), and Lewis and Clark (12 percent) counties.

Although BLM forage comprises a relatively small share of total AUMs in the study area, this forage may be particularly valuable to livestock producers because grazing fees (\$1.35/AUM in FY2008) are considerably lower than the statewide average of \$16 per AUM (USDI, BLM, 2004i). Access to BLM and Forest Service grazing may be important to area livestock producers even though additional management costs are usually incurred to use these lands. The difference between the statewide average grazing fee (\$16/AUM) and the BLM fee (\$1.35/AUM) represents a consumer surplus to the permittee of up to \$14.65 per AUM. The total consumer surplus associated with 25,677 AUMs is up to \$376,000.

The response coefficients shown in Table 3-43 indicate how total employment and total labor income respond to changes in levels of livestock grazing.

Table 3-43 Response Coefficients Associated with Grazing Management			
Class of Livestock	Units	Total Employment (jobs/M units)	Total Labor Income (\$/M units)
Cattle and Horses	HMs	0.34	6,090
Sheep and Goats	HMs	0.14	1,190

Source: IMPLAN, 2007

Table 3-42 Animal Unit Months by County, 2003				
County	Total Cattle	Total AUMs	BLM AUMs¹	BLM % of Total AUMs
Beaverhead	81,000	972,000	426	0.044
Broadwater*	12,700	152,400	4,151	0.027
Deer Lodge	5,700	68,400	483	0.71
Gallatin	22,900	274,800	1,013	0.37
Jefferson*	12,600	151,200	4,058	2.68
Lewis and Clark*	21,800	261,600	1,689	0.65
Park	25,300	303,600	723	0.24
Silver Bow*	5,500	66,000	1,119	1.70
Total	187,500	2,250,000	13,662	0.61

*RMP-related effects are most likely to occur in these counties, where the majority of the PA lands are located.

AUMs – Animal Unit Months ¹ BLM AUMs in this context refers to those AUMs within the Butte Field Office PA.

Source: USDI-BLM 2004c.

Mining

Although mining has played a very significant role in the past in the PA, mining employment decreased as a share of total covered employment during the 1990s in all study area counties where data are available. In 2001, the mining sector accounted for less than one percent of total covered employment in four of the eight study area counties, compared to 1.4 percent statewide.

Mining employment did, however, account for approximately 14 percent of total covered employment in Jefferson County and 3.5 percent in Broadwater County (Table 3-44).

Table 3-44 Mining Employment by County, 2001		
	Mining	% of Total Employment
Beaverhead	(D)	(D)
Broadwater*	40	3.5
Deer Lodge	26	0.8
Gallatin	63	0.2
Jefferson*	303	14.0
Lewis and Clark*	20	0.1
Park	5	0.1
Silver Bow*	145	1.1
Montana	5,542	1.4

*RMP-related effects are most likely to occur in these counties, where the majority of the PA lands are located.

(D) – Disclosure suppression.

Source: Montana Department of Labor and Industry, 2004b.

The mining sector is typically well paid. The average annual salary for the mining sector in Montana was \$51,787 in 2001, compared to an average annual state salary of \$25,194. Average annual salaries by mining subsector ranged from \$41,000 for the mining and quarrying of nonmetallic minerals to \$57,486 for metal

mining (Montana Department of Labor and Industry 2004b).

The response coefficients shown in Table 3-45 indicate how total employment and total labor income respond to changes in mineral production for various commodities.

Environmental Justice

Environmental justice refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies. It focuses on the consideration of environmental hazards and human health to avoid disproportionately high and adverse human health or environmental effects on minority and/or low-income populations. Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons are defined as minority populations by the Interagency Working Group convened under the auspices of the Executive Order. Low-income populations are defined as persons living below the poverty level based on total income of \$19,971 for a family household of four based on the 2000 census.

None of the defined minority populations represent more than 3 percent of the population in the PA, based on 2000 census numbers. There are no Indian Reservations located in or in close proximity to the PA.

Members of the Confederated Salish-Kootenai Tribes of the Flathead Reservation are known to use resources on public lands in the PA for cultural (and to a lesser extent subsistence) purposes. The Flathead Reservation had a 2000 American Indian population of 6,999.

In 1999, 14.6 percent of the persons living in the state of Montana had incomes below the poverty level. In the PA, the percent of persons living below the poverty level ranges from 9 percent in Silver Bow County to 17.1 percent in Beaverhead County. The average per capita income was \$17,151 for the State of Montana. In the PA, this compares to a low of \$15,580 in Deer Lodge County and a high of \$19,074 in Gallatin County.

Table 3-45 Response Coefficients Associated with Mineral Production			
Mineral Commodity	Units	Total Employment (jobs/M units)	Total Labor Income (\$/M units)
Oil and Gas Extraction (Natural Gas)	M Cubic Feet	0.03	2,260
Stone Mining and Quarrying (Crushed Stone Common variety)	Short Tons	0.05	2,060
Stone Mining and Quarrying (Crushed Stone High Purity)	Short Tons	0.05	2,100
Dimension Stone	Short Tons	2.56	103,570
Construction Sand and Gravel	Short Tons	0.05	2,120

Source: IMPLAN, 2007

